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Haiti Relief

An International Effort Enabled through Air, Space, and Cyberspace

Gen Douglas M. Fraser, USAF
Maj Wendell S. Hertzelle, USAF

To the people of Haiti, we say clearly, and with conviction, you will not be forsaken; you will not be forgotten. In this, your hour of greatest need, America stands with you.
—Pres. Barack Obama, 14 January 2010

On 12 January 2010 at 21:53:10 Greenwich Mean Time, Haiti experienced a 7.0-magnitude earthquake centered 10 miles west-southwest of Port-au-Prince.[1] Several factors contributed to the destructiveness of this quake: its shallowness, which made the shock waves much more pronounced; the overcrowded capital city, which was overdeveloped with inconsistently applied and loosely enforced construction standards; and the lingering effects of a string of three hurricanes and one tropical storm that struck during a 23-day period in the summer of 2008. Almost 150 years had passed since Haiti had fallen victim to an earthquake of this magnitude. The devastation proved tremendous. The latest United Nations (UN) estimates indicate that more than 222,000 people were killed, 300,000 injured, and 2.3 million displaced by the earthquake and its 59 aftershocks.[2]

Thirteen of the 15 government ministry buildings were completely destroyed. Forty to 50 percent of all buildings in Port-au-Prince and its environs sustained significant damage, some locales as much as 80 percent, as in Léogâne, a city of 78,477 people 19 miles west of Port-au-Prince.[3] The earthquake rendered the airport's control tower inoperable and left more than half the seaport in ruins. Later that night, the president of Haiti declared a national state of emergency and, in doing so, requested that the United States help provide humanitarian assistance and disaster relief. The US ambassador to Haiti responded by issuing a disaster declaration, confirming that the situation warranted US aid.

At dawn on 13 January, under the direction of United States Southern Command (USSOUTHCOM), elements of the Department of Defense (DOD) arrived to support the Government of Haiti (GoH) and the US Embassy. In Miami, USSOUTHCOM's headquarters staff received specialty augmentation from across the DOD and the rest of the US government to increase the staff's ability to respond to the disaster. In addition, on 14 January the command established Headquarters Joint Task Force-Haiti, led by Lt Gen P. K. "Ken" Keen, with the mission of carrying out humanitarian assistance and disaster-relief operations in support of the United States Agency for International Development, the principal federal agency for the US effort. So began Opera-

DOD photo

A US Soldier briefs Gen Douglas Fraser, left, and Lt Gen Ken Keen, center, at Ancien Aeroport Militaire's displaced-persons camp in Port-au-Prince on 6 March 2010.

tion Unified Response, an incredible international effort to help a nation. The innovative and swift application of air, space, and cyberspace capabilities enabled a rapid, flexible, and focused response that saved lives and mitigated suffering.

Opening the "Lifeline"

Due to the magnitude of destruction and uncertainty about the condition of the runway at Toussaint L'Ouverture International Airport in Port-au-Prince, Lieutenant General Keen and I believed that the airfield "needed someone on the ground quickly and [that] a safely operating airfield was essential."[4] Accordingly, the 1st Special Operations Wing's Joint Special Operations Air Component quickly received a tasking and arrived approximately 26 hours after the earthquake. Adapting to bare-bones conditions, controllers set up their equipment and began directing traffic within 28 minutes of arriving.[5]

The following day, to support the efforts of this unit and the Haiti relief operations, Airmen from Joint Base McGuire-Dix-Lakehurst, New Jersey, launched the 817th Contingency Response Group under the command of Col Patrick Hollrah, who commented on their fast reaction: "This is what we are trained to do and it's what we do well—we respond rapidly and effectively in hopes we can alleviate unnecessary suffering and provide a platform for further relief efforts."[6] Prior to the earthquake, Toussaint L'Ouverture International Airport averaged 12 to 15 flights per day. Afterward, within 72 hours, the combined efforts of the wing and group took the airfield from limited

daylight operations with rudimentary control and cargo processing to around-the-clock operations of over 60 flights per day. Over the next few days, these innovative Battlefield Airmen increased the activity on this single runway, which had no parallel taxiway, to over 140 fixed-wing and 200 rotary-wing flights per day.

By opening the air lines of communication, Airmen established a friendly center of gravity and, from Lieutenant General Keen's perspective, created a "lifeline for Haiti—from civilian [nongovernmental organizations]."[7] For the first three to four days following the earthquake, the Port-au-Prince airport served as the primary entrance to Haiti. In addition to Las Américas International Airport in Santo Domingo, San Isidro Air Base in Santo Domingo and Maria Montez Air Base in Baharona, Dominican Republic, opened as alternate airfields on 19 January. A Canadian team opened Jacmel Airfield, in southern Haiti, to support its operations. Even though these airfields offered critical support and divert destinations for aircraft arriving from around the globe, overland travel time and congested two-lane highways limited their combined utility to roughly 7 percent of the total air cargo arriving in Haiti.

Using these airfields, search and rescue units from around the world as well as the US Agency for International Development's disaster-assistance response teams arrived quickly to begin rescue operations. Lieutenant General Keen pointed out that "getting there in hours, not days, saved lives," reflected by the rescue of 132 individuals trapped in rubble.[8] This simply would not have happened without the speed of airflow and the cargo-handling efficiency supplied by US Air Force Airmen through the aerial port in Haiti.

Organizing and Controlling Relief Flights into Haiti

Building the smooth flow of a vast array of international relief aircraft into Port-au-Prince did not occur easily. Prior to the earthquake, daily airfield traffic volume amounted to about 30 movements (a movement equals one landing or takeoff). By way of comparison, Miami International Airport averaged some 1,000 movements per day in 2009.[9] As mentioned earlier, the sole runway with no parallel taxiway and a single point of entry/exit to the ramp from the runway represented the key impediments to increasing flow at the airport. In addition to these limitations, the ramp had only 10 parking locations under ideal conditions (for two wide-body and approximately six smaller aircraft). Finally, further constraints on aircraft and cargo throughput included the variety of aircraft; cargo loads, as well as download time for both passengers and cargo; and the need to accommodate "super wide-body" jets.[10]

To reconcile these issues and establish a more orderly flow, the GoH requested that the US Air Force and the Federal Aviation Administration establish a Haiti Flight Operations Coordination Center (HFOCC) to manage inbound air traffic and speed up delivery of humanitarian aid.[11] In concert with the GoH, the UN, and the World Food Program, the HFOCC provided coordinated and collaborative command and control for the efficient delivery of relief supplies to meet the GoH's priorities.

The HFOCC implemented a process using a phone registration system, coordinating calls through the 601st Air Operations Center at Tyndall AFB, Florida.[12] Aircrews received a notice to Airmen from the International Civil Aviation Organization to contact the 601st's call center and coordination center for scheduling "slot times" for arrival into the Port-au-Prince airport. This process emerged from lessons learned during the support of aerial relief operations for Hurricane Katrina. The HFOCC modeled it after Air Mobility Command's concept of the regional air movement coordination center. The slot-times system allowed for an orderly, prioritized, and controlled flow of aircraft into Haiti.

Working to accommodate the international response, the World Food Program sent a representative—Philippe Martou, its deputy chief of aviation services—to the HFOCC in Tyndall to support the GoH and international management of air traffic into Haiti. His invaluable support and expertise helped the 601st Air Operations Center and Air Forces Southern manage the airflow into Haiti. According to Julissa Reynoso of the US Department of State, "After the implementation of the HFOCC, no aircraft operator who requested a 'slot time' was denied; however, they may not have received the exact slot they requested."[13] At the height of the relief effort, operating at 120–40 flights per day, organizations requesting slot times still faced a backlog of 10 days (1,400 slots reserved). However, when urgent requests for prioritization came in, Ms. Reynoso played a key role in working with the GoH to ensure a proper flow of arriving aircraft, in accordance with established GoH priorities.

Unfortunately, the phone system could not meet the demand and became saturated. To facilitate customer requests and increase transparency, USSOUTHCOM communications and information-management experts, working with the HFOCC, developed a web-based system for assigning slot arrival times. Although this program underwent "beta testing" during Unified Response, it never went live. Nevertheless, the system has potential for use in future disasters.

Through the skill of the airfield controllers, the work of the 817th Contingency Response Group's cargo handlers and logistics technicians, and the efficiencies created by the slot-time system, traffic at the Port-au-Prince airport reached its peak. However, as alternative logistical options became available, demand at Toussaint L'Ouverture International slowly decreased, and by 19 February, civilian commercial airline service to the nation had resumed, completely under the control and management of Haitian air traffic controllers.

Broadening the Support Base through Teamwork

From all across the United States, assistance converged on Haiti. Although constituting only a small piece of the entire effort, at least 71 wing-level units from active, Guard, and Reserve components at more than 35 locations supported the movement of relief materials and supplies, exemplifying the Air Force's "total force" model. Still, in order to meet the level of support required in Haiti, yet continue to satisfy demands in Iraq and Afghanistan, Air Mobility Command brought into play aircraft normally reserved for training.

The command made an all-out effort to surge its capacity and meet the logistical challenges. In solidarity with the Department of State, it assured the safe evacuation of 16,412 American citizens and eligible family members—perhaps the largest evacuation that has ever occurred in peacetime. Furthermore, US military aircraft medically evacuated 343 injured Haitians. Continuing this display of teamwork, Joint Base McGuire-Dix-Lakehurst received one of the first large groups of US citizens. Working with the Department of Health and Human Services, Department of State, Department of Homeland Security, Red Cross, and scores of local civic and religious organizations in New Jersey, the base's forces erected a temporary relief center for receiving, feeding, medically treating, and reuniting 579 personnel with their families.

Intelligence, Surveillance, and Reconnaissance

The devastation left behind by the earthquake presented many challenges, but it also opened the door for innovative uses of military and civilian imaging assets. The critical visual imagery and data that they collected helped inform decisions concerning the distribution of humanitarian aid, assess damage to buildings and other infra-

structure, and alert relief agencies to potential locations of increased risk.

Within two days of the earthquake, an Air Force Global Hawk remotely piloted aircraft (RPA) and a Navy P-3 began transmitting visual data needed to assess critical infrastructure such as airfields, ports, roads, bridges, and key buildings in Haiti. Moreover, a U-2 gathered very high resolution imagery of Port-au-Prince, expediting the assessment of damage.

In addition to still photos, Predator RPAs collected full-motion video during around-the-clock coverage of select areas in the country. Joining with the DOD to enhance our humanitarian response to this crisis, the Federal Aviation Administration signed an emergency certificate of authorization allowing RPA operation from the civilian airfield of Rafael Hernandez, Puerto Rico, into Haiti. This action marked the first time a Predator had supported a humanitarian operation, proving that RPAs can operate safely alongside civilian and international air traffic.[14] Dissemination of the video collected by the Predators to a variety of users, both on the ground in Haiti and at locations outside the area of operations, provided vital situational awareness for humanitarian assistance / foreign disaster-relief operations and helped pinpoint potential hot spots that might compromise relief activities.[15]

However, imagery was only a first step. In partnership with Google, high-tech government contractors from USSOUTHCOM created a real-time interactive and collaborative environment that generated a three-dimensional image of the devastation in Haiti.[16] By comparing historical satellite imagery taken by Google with images captured by intelligence, surveillance, and reconnaissance (ISR) aircraft after the earthquake, analysts could assess the level of destruction. Fortuitously, an earlier collaborative effort among 10 space agencies from around the globe produced the international charter known as "Space and Major Disasters" to deliver free imagery products to victims of natural or man-made disasters. On 13 January 2010, this charter was activated for Haiti so that it could receive this imagery.[17] Assessments made from available imagery allowed engineers to prioritize their efforts and permitted the UN to determine alternatives for sheltering displaced persons.

Though laudable, the sharing and collaborating that took place during Unified Response still did not overcome some of the fundamental difficulties inherent in synthesizing multiple systems. Michael Moore, deputy director of the Joint Intelligence Operation Center-South, remarked that during Haiti "we did not have end-to-end ISR architecture and capability. The information was not interoperable and to make a composite picture, we had to stitch it together."[18] Planners need to revisit this challenge as they prepare for future relief operations.

Providing Distribution Alternatives

A Light Detection and Ranging System, deployed by the Massachusetts Institute of Technology's Lincoln Laboratory aboard a Sabreliner aircraft, created a unique three-dimensional image of the terrain, helping geologists identify fault areas around Haiti and focusing debris-removal efforts. The heightened situational awareness produced by this and other imaging systems enabled the joint task force to identify blocked transportation routes and helped other relief organizations adjust delivery routes and expedite distribution.

Due to congested distribution routes and the lack of infrastructure, aerial means became essential for the immediate delivery of relief supplies. Specifically, helicopters from the USS *Carl Vinson*, the 22d Marine Expeditionary Unit of the USS *Bataan* Amphibious Ready Group, and the 24th Marine Expeditionary Unit of the USS *Nassau* Amphibious Ready Group dispensed these supplies to secured landing zones. The latter were coordinated with the GoH in accordance with distribution plans developed by the UN and the US Agency for International Development / Office of Foreign Disaster

Assistance. To ensure the orderly dissemination of supplies, prior to delivery we put in place security forces from various sources such as the UN Police, UN Stabilization Mission in Haiti, Haitian National Police, 82d Airborne, and 22d Marine Expeditionary Unit.

Aerial delivery from US Air Force C-17s, used on a limited basis, constituted yet another option. For example, on 18 January 2010, Airmen from the 437th Airlift Wing at Charleston AFB, South Carolina, delivered 14,000 meals, ready to eat and 14,000 quarts of water during a seven-hour round-trip mission. While the jet was en route, members of Joint Task Force-Haiti secured the area to ensure the safety of the local populace and effect the distribution.[19]

Both rotary- and fixed-wing delivery methods offered the flexibility to swiftly reach people in need. Yet, along with this flexibility came such issues as placing security and relief personnel on scene at each location to secure distribution points and enable the safe and orderly disbursement of relief supplies. This effort required effective planning and coordination across the international community, under the direction of the government.

Leveraging Cyberspace Capabilities

Adapting to lessons learned from past responses to disasters, USSOUTHCOM dedicated significant energy to making available an unclassified, open-source method of sharing information with the entire international relief community. We used the All Partners Access Network (APAN), a web-based tool designed by US Pacific Command, to enhance collaboration and operational coordination. With its open password registration, APAN attracted over 1,800 users during the first three weeks and quickly

USAF photo

Container Delivery System bundles from a US Air Force C-17 coming down outside Port-au-Prince

became one of USSOUTHCOM's chief means of sharing information outside the command's domain. "Social networking" helped USSOUTHCOM respond to requests for assistance, maintain situational awareness through user updates, and share DOD imagery with the international community.

In addition to employing APAN to spread information, the command used various other social networking services such as Facebook, Twitter, Flicker, YouTube, and ReliefWeb to gather and share information. All played a part in providing an accessible source of data to responders. However, the huge volume of information presented the command with the challenge of "min[ing], compil[ing], analyz[ing] and disseminat[ing] both traditional and nontraditional data sources at the speed of the information environment."[20]

At the same time, and in partnership with Google, USSOUTHCOM created a web-enabled user-defined operational picture. That is, non-DOD users, academics, and people on the street in Haiti uploaded pictures from their smart phones and shared other geospatial information through the web, all linked to the three-dimensional Google Earth user-defined operational picture, which enhanced collaborative situational awareness. However, if we accept data from various sources, then we must take time to discern whether some of it might be disinformation if perceived in the wrong context. Therefore, peer review becomes important, and the fusion of peer-reviewed data uploaded to a common point of reference gives participants a clearer picture of what is occurring. By utilizing Web 2.0 technologies such as portals, wikis, blogs, and chat rooms, USSOUTHCOM is building a flatter, faster information environment for use in future relief operations.

Conclusion

The US Agency for International Development recently reported that, to date, the US government's response to the Haiti earthquake totaled $1,156,554,816. Certainly a vast amount, this expenditure of resources nevertheless pales in comparison to the partnerships, relationships, and international commitment that made a relief effort such as Operation Unified Response a success. This level of teamwork comes together only through trust and interoperability garnered from training and shared experiences.

As Haiti recovers and rebuilds, these same assets will continue to pay dividends. Undoubtedly, future humanitarian assistance / foreign disaster-relief operations will benefit from the innovative air, space, and cyberspace applications that lent swift aid to a devastated nation. ✪

Notes

1. "Magnitude 7.0—Haiti Region," US Geological Survey Earthquake Hazards Program, 12 January 2010, accessed 18 October 2010, http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/us2010rja6.php#details.

2. "Haiti Crisis," United Nations Development Programme, accessed 18 October 2010, http://www.undp.org/haiti/.

3. "Haiti," *City Population*, 15 March 2010, accessed 18 October 2010, http://www.citypopulation.de/Haiti.html.

4. Lt Gen P. K. Keen, interview by the author, 27 August 2010.

5. 612th Air Operations Center / Air Mobility Division, briefing, subject: Operation Unified Response, 26 March 2010.

6. "AMC Provides Rapid Response for Haiti Relief Effort: Operation Unified Response," *Airlift/Tanker Quarterly* 18, no. 1 (Winter 2010): 19, accessed 18 October 2010, http://www.atalink.org/ATQ/Issues/ATQ_Winter_2010.pdf.

7. Keen, interview.

8. Ibid.; and "Haiti Quake Victim Rescue Operation Declared Over," *BBC News*, 23 January 2010, accessed 18 October 2010, http://news.bbc.co.uk/2/hi/americas/8476474.stm.

9. "Traffic Movements 2009 Final," Airports Council International, 5 August 2010, accessed 18 October 2010, http://www.airports.org/cda/aci_common/display/main/aci_content07_c.jsp?zn=aci&cp=1-5-54-57_666_2__.

10. 612th Air Operations Center / Air Mobility Division, briefing.

11. Department of State cable from Patrick Kennedy, undersecretary for management.

12. Mary McHale, "U.N. Aviation Expert Assists 601st AOC with Haiti Ops," Air Combat Command, 1 February 2010, accessed 18 October 2010, http://www.acc.af.mil/news/story.asp?id=123188335.

13. Julissa Reynoso, Department of State, Western Hemisphere Affairs, interview by the author, 4 October 2010.

14. Capt Nathan D. Broshear, "Airmen Fly Predator in Controlled Airspace over Haiti," *Air Force Link*, 28 January 2010, accessed 18 October 2010, http://www.af.mil/news/story.asp?id=123187806.

15. Warren D. "Doug" Quets Jr., senior ISR adviser, Twelfth Air Force (AFSOUTH), interview by the author, 7 September 2010.

16. Aleksandra Kulczuga, "Haiti Helps Pentagon Dissipate the Fog of War," *Daily Caller*, 18 February 2010, accessed 18 October 2010, http://dailycaller.com/2010/02/18/haiti-helps-pentagon-dissipate-the-fog-of-war/.

17. "Earthquake in Haiti," International Charter: Space and Major Disasters, accessed 18 October 2010, http://www.disasterscharter.org/web/charter/activation_details?p_r_p_1415474252_assetId=ACT-287.

18. Michael Moore, USSOUTHCOM J2, deputy director, Joint Intelligence Operation Center-South, interview by the author, 27 August 2010.

19. "Air Deliveries Provide Critical Supplies to Earthquake Victims," *Air Force Link*, 18 January 2010, accessed 18 October 2010, http://www.af.mil/news/story.asp?id=123186092.

20. Moore, interview.

Gen Douglas M. Fraser, USAF

General Fraser (USAFA; MS, Arizona State University; MS, National War College) is the commander of US Southern Command (USSOUTHCOM), Miami, Florida. He commands one of six geographic combatant commands that promote US strategic security interests. USSOUTHCOM is a joint, multinational, and interagency organization charged with overseeing all US military operations in Central and South America and the Caribbean, a region that includes 31 countries and 10 territories with a population of more than 470 million. Prior to assuming his current position, he served as the deputy commander of US Pacific Command and the commander of Alaska Command. A command pilot with more than 2,700 flying hours, primarily in the F-15A/B/C/D, F-15E, and F-16, General Fraser is a graduate of Squadron Officer School, Air Command and Staff College, and National War College.

Maj Wendell S. Hertzelle, USAF

Major Hertzelle (USAFA; MSAA, University of Washington) is the Air Force special assistant to the commander in the Commander's Action Group, US Southern Command. He provides quick-turn focused action, strategic communication, and operational research and analysis to support the commander's strategic objectives. Prior to his current position, he was interagency coordinator for development in the J9 and air operations officer for the Standing Joint Force Headquarters. He has served as an instructor and evaluator pilot in the KC-135R/T, flying both tanker and receiver versions in support of conventional and special operations contingencies around the globe. He has deployed in support of Operations Southern Watch, Allied Force, Iraqi Freedom, and Enduring Freedom. Major Hertzelle is a graduate of Squadron Officer School, Air Command and Staff College, and Joint Forces Staff College.

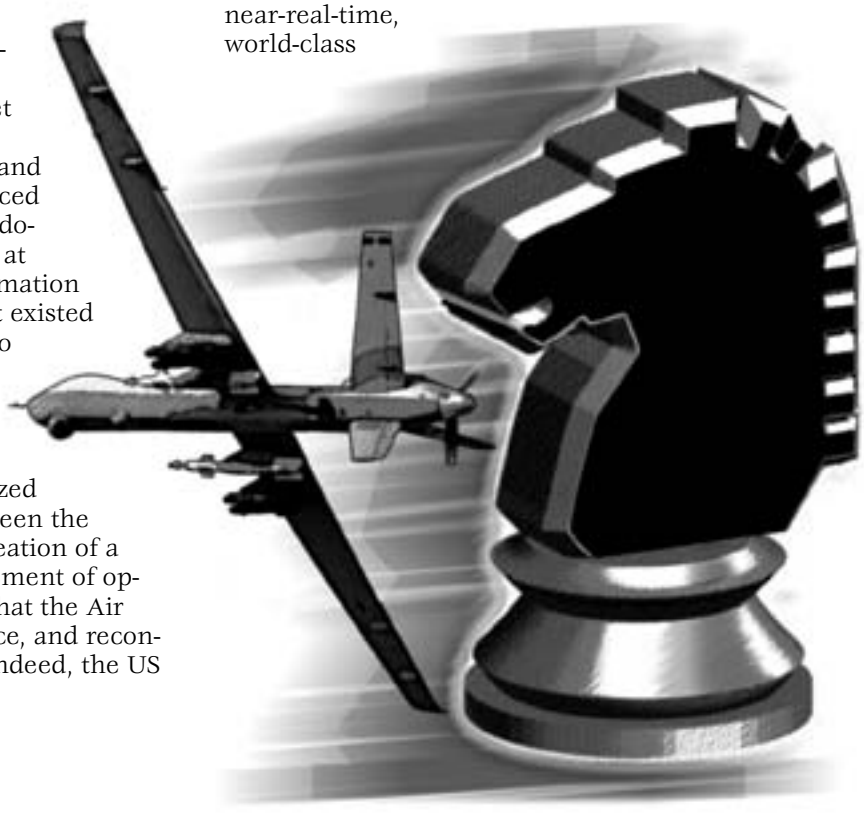
Air Force ISR Operations

Hunting versus Gathering

Lt Gen Dave Deptula, USAF, Retired
Col Mike Francisco, USAF, Retired

An often-repeated axiom attributed to General of the Army Omar Bradley opines that "amateurs talk about strategy, professionals talk about logistics." This well-worn adage not only contains an obvious element of wisdom and timelessness but also expresses a fundamental shift in the context of today's emerging era of military operations. Specifically, amateurs do continue to talk about strategy, but professionals increasingly talk about information—how to get it, use it, and keep getting it, given the speed, complexity, and character of the challenges faced by our forces abroad and our domestic security organizations at home. This elevation of information in war has closed the gap that existed in the past between those who created intelligence and those who operated with that intelligence.[1] Still, there remains much distance to cover in creating a synchronized and precise relationship between the view of information as the creation of a product and as a seamless element of operations. This article argues that the Air Force intelligence, surveillance, and reconnaissance (ISR) enterprise—indeed, the US military itself—must undergo a cultural transformation and trade the farmer's view of ISR (methodically producing information) for the hunter's view (anticipating, finding, and fixing an elusive and often dangerous prey) in order to meet the challenges of the coming decades and eliminate the segregation that has historically existed between ISR and operations.

The Air Force ISR team does a superb job of collecting, analyzing, and reporting. It conducts both national and theater ISR missions, manages immensely complex collection decks, and operates air and space sensors globally with near-real-time, world-class



analysis across service, coalition, joint, and national centers that inform a host of regional and national priorities.[2] This approach, though highly efficient, bears more resemblance to a "batch process" such as farming—preparing the fields, gathering the harvest, and periodically delivering it to market—than to hunting elusive game animals. Even with our theater ISR air assets, we are collecting and providing information to others rather than anticipating and hunting the information we will need next. Air Force ISR today *is* operations, but in applying it to the emerging context of today's tasks, we have a strategic imperative to do better. We need only review our track record in dealing with Iraqi Scuds, Bosnian SA-3 surface-to-air missiles, high-value individuals in Iraq and Afghanistan, and the present and future capabilities of mobile enemy weapons to realize the importance of improvement.

So how does the Air Force evolve the capabilities of its world-class ISR enterprise from the mind-set of a farmer to that of a hunter? The first step calls for codifying into doctrine the concept that the Air Force's global integrated ISR mission includes hunting and actively participating in the destruction or negation of certain classes of targets—leading to defining, training, and refining the necessary ISR skills to fulfill these missions. Few people today recall that the ancestor of the 480th ISR Wing was an organization that knew how to hunt German submarines and actively participate in the kill.[3] To help meet today's ISR issues, we have at our disposal our air, space, and cyber operations centers; our ISR sensor systems deployed throughout the world and in space; the Air Force distributed common ground/surface system (DCGS-AF, the leading-edge element of the Defense Intelligence Information Enterprise), which integrates sensors, communications, and analysis; and the Air Force's manned and managed intelligence centers such as the National Air and Space Intelligence Center. Linking these ISR nodes has shown great promise when adapted to the role of a hunter—a process that we must codify if we wish to grow and meet the challenges of the future.

To deal with the irregular warfare taking place today in Iraq and Afghanistan, the Air Force created forward-based ISR exploitation cells (ISREC), whose mission has evolved from dedicated unit-level processing, exploitation, and dissemination of information gleaned from MC-12W aircraft, to the incorporation of new sensors for MQ-9 Reaper wide-area electro-optical and ground moving-target-indicator surveillance, to the soon-to-be-deployed Gorgon Stare wide-area airborne surveillance system.[4] At the ground-component division and below, ISR liaison officers enable both the DCGS-AF and the ISRECs to successfully integrate the global Air Force ISR network into surface-force planning and operations. However, we have not yet codified the concepts behind the liaison officers and ISRECs into Air Force doctrine or tactics, techniques, and procedures (TTP) manuals.[5] We will lose these powerful connections and their resulting lessons unless we do so. By integrating these types of cross-cueing and translation actions across the spectrum of Air Force ISR operations, we are beginning to define the requirements for creating a true ISR-hunting paradigm.

Next, the Air Force should implement a coherent approach that binds our air and space operations centers, the DCGS-AF, and the network-centric collaborative targeting system—not just to provide information but to conduct ISR operations in the role of a hunter. Most importantly, this approach includes developing trained ISR Airmen proficient in dynamic operations as *real-time* participants in the hunt—not simply intelligence analysts or collectors and reporters of batches of ISR information to a joint headquarters. The Air Force needs ISR warriors "on the wing" with the shooters—as they were late in the Vietnam air war over Hanoi in the Teaball program.[6] Such a concept does not obviate the need for image analysts, signals analysts, and individuals proficient in other intelligence

skill sets—they are absolutely essential to both the military and national intelligence community. However, it does demand a systematic approach to organizing, training, and equipping ISR hunters. As an Air Force core function, air and space superiority requires providing ISR hunter capabilities to joint force commanders to counter integrated air defense systems, theater ballistic missiles, and the antisatellite capabilities of America's potential adversaries—again, as core functions, not merely in support of the intelligence community.

Thus, the Air Force ISR Agency must assign the 480th ISR Wing, ISR groups, their analysis and reporting teams, and their ISRECs a hunting mission for defined classes of mobile targets and must establish procedures to execute that mission. Those entities need training and proficiency in cross tasking (sharing information) in near real time, the situational awareness necessary to operate effectively, the ability to use their networks to enable real-time collaboration with ISR hunter analysts in air and space operations centers, and an enterprise approach focused on "finding, fixing, and finishing." That preparation will enable them to have the right answers quickly enough for time-critical targeting cells to act effectively against fleeting targets, thereby exemplifying decentralized execution by Airmen who understand the intent of the mission orders provided by the joint force commander. This approach necessitates skills different from the rote execution of specific collection and reporting tasks assigned by a headquarters or by the collective intelligence community. The Air Force ISR enterprise must become proficient at implementing mission-type orders as a core function of the entire organization.

Consequently, the ISR division (ISRD) of a combined/joint force air component commander's (C/JFACC) joint/combined air and space operations center must learn hunter collection management and ways of sustaining "killer" decision making for those mission sets. Today, these are separate processes. Giving the C/JFACC the wherewithal to advocate the right collection allocations to assigned mission sets and supply near-real-time decision support is essential. The ISRD must become an effective partner in brokering collaboration between DCGS-AFs and Air Force ISR collectors/analysts, knowing how to find and use national data tactically, and making decisions that enable the execution of time-critical hunter/killer operations faster than enemies can react. In the language of John Boyd, the ISRD must execute and accelerate the observe, orient, decide, act loop for ISR operations and tie it to the joint force commander's mission objectives in mere minutes—in some cases, seconds—as an active participant.

For air, space, and cyberspace ISR operations personnel, this requirement means they must understand and have training in how to use their systems effectively to participate in the hunt and in how to collaborate productively with each other. By understanding the enemy and the missions that air, space, and cyber forces execute, they can apply their sensor expertise to that goal and become more useful to the C/JFACC, delivering true hunting capability to joint or combined force commanders and allies. Today our ISR sensor warriors are driven by the collection deck, a complex set of tasks that issues from prioritization of large numbers of requests for information from a rear-area headquarters—more similar to a market process than a hunting regimen. It's time to change this anachronistic process, which is based on capability and culture from the middle of the last century. Because animals, submarines, terrorists, or surface-to-air missiles all hide from and avoid the hunter, he needs to understand their signs and prepare himself to sense, react, and shoot quickly.

As part of this process, we must develop TTPs that fuse ISR forces, shooters, and command and control elements as teammates in executing find, fix, and finish missions end-to-end on tactically useful timelines. These TTPs should incorporate the concept of employing sensors for ISR hunter-mission tasking. All the elements of

the ISR hunter architecture should understand the technical capabilities needed to execute ISR hunter missions, both in dealing with the fog and friction of actual warfare and in defining future system requirements and human interfaces. A key part of this enterprise approach should involve establishing an ISR test and evaluation unit at Nellis AFB, Nevada, to address ISR operational integration with current units that conduct command and control, air, and space system test and evaluation. Our present structure of using geographically dispersed, unrelated detachments to test U-2, MQ-1, MQ-9, RQ-4, and other ISR platforms precludes true operational testing of various configurations in carefully reproduced combat conditions, or layering and integrating ISR in test scenarios as we envision employing these capabilities. Finally, as with other operational forces in the Air Force, we need training and certification requirements, including continuation training, certification and proficiency identifiers, and metrics of ISR combat capabilities across the spectrum of Air Force mission areas. As a beneficial by-product of these efforts, if implemented, we will move from our historical "industrial age" military culture that far too long has segregated operations from intelligence, to a culture better suited to the information age—one that integrates operations and intelligence, producing unprecedented synergies in action, accuracy, and effectiveness.

We stand at the cusp of a new era in military operations in which the speed of information, advancements in technology, networking of our organizations, and mind-set of our people will directly shape the success or failure of our future military activities. The foundations of our achievement will hinge on the ability to sense, know, decide, and act ahead of our adversaries on a global scale. These technologies and challenges have trumped the buffer of geography that historically afforded us the luxury of time to think and act, demanding that we alter our ISR farmer-culture mind-set and begin to act more like hunters. Our ISRECs have given us a glimpse of this hunting role, but we must do more to apply what we've learned from this experience to carry us through tomorrow's tasks. In an important first step, we must capture in our doctrine the importance of harnessing and linking every node in our ISR enterprise to hunt rather than simply farm, and we must change how our military forces think about their role in the ISR enterprise. In the future, Air Force ISR professionals must assure the availability of information necessary to bring a strategy to a successful outcome well before we need it. ✪

Notes

1. Lt Gen David A. Deptula and Maj R. Greg Brown, "A House Divided: The Indivisibility of Intelligence, Surveillance, and Reconnaissance," *Air and Space Power Journal* 22, no. 2 (Summer 2008): 5–10, http://www.airpower.au.af.mil/airchronicles/apj/apj08/sum08/sum08.pdf.

2. A collection deck is a list of ISR targets compiled by the collection manager and approved by the joint force commander. The ISR division of the combined/joint force air component commander assigns and synchronizes air, space, and cyberspace ISR systems to collect from the targets on the list.

3. "Guarding the Straits of Gibraltar: March–October 1943," *United States Army Air Forces in World War II*, accessed 15 July 2010, http://www.usaaf.net/ww2/uboats/uboatspg5.htm.

4. Lt Gen David A. Deptula, "Airpower in an Information Age" (briefing to the Air Force Association, Arlington, VA, December 2009).

5. Maj Stephen C. Price Jr., "Close ISR Support: Re-organizing the Combined Forces Air Component Commander's Intelligence, Surveillance and Reconnaissance Processes and Agencies" (thesis, Naval Postgraduate School, Monterey, CA, December

2009), 200–201, 272, 277, accessed 28 July 2010, http://edocs.nps.edu/npspubs/scholarly/theses/2009/Dec/09Dec_Price.pdf.

6. Maj Gen Doyle Larson, "Direct Intelligence Combat Support in Vietnam: Project Teaball," *American Intelligence Journal* 15, no. 1 (Spring/Summer 1994): 56–58, accessed 15 July 2010, http://www.nmia.org/images/AIJ_15_1_Direct_Intelligence_Combat_Support_in_Vietnam,_Project_Teaball_Larson.pdf.

Lt Gen Dave Deptula, USAF, Retired

Lieutenant General Deptula (BS, MS, University of Virginia; MS, National War College) retired from the Air Force as deputy chief of staff for intelligence, surveillance, and reconnaissance, Headquarters USAF, Washington, DC, in October 2010. He completed ROTC at the University of Virginia as a distinguished graduate. Having flown more than 3,000 hours (400 in combat), including multiple assignments to operational fighter commands, he has significant experience in combat and leadership in several major joint contingency operations. General Deptula has twice been a joint task force commander, a joint force air component commander, and director of a combined air operations center. He also served as principal attack planner for the air campaign during Operation Desert Storm. He has served on two congressional commissions charged with outlining America's future defense posture: the Commission on Roles and Missions of the Armed Forces and the National Defense Panel. Prior to becoming deputy chief of staff for intelligence, surveillance, and reconnaissance, he was commander of the General George C. Kenney Warfighting Headquarters in the Pacific. General Deptula is a graduate of Squadron Officer School, US Air Force Fighter Weapons School, Air Command and Staff College, Armed Forces Staff College, and National War College.

Col Mike Francisco, USAF, Retired

Colonel Francisco (USAFA; MPA, Auburn University) is a former F-4/F-15 pilot with 20 years of experience in space and air intelligence, surveillance, and reconnaissance (ISR), and 20 years as a combat aviator and commander. He completed two tours in Vietnam, including 107.5 missions conducting reconnaissance and strike control as an F-4E "Stormy" forward air controller and 188 other combat missions flying long-range strike, close air support, and air superiority missions. He attended the USAF Fighter Weapons School, commanded an F-15 squadron and group, served on the Air Staff's Tactical Air Command Panel, and led the Air Force's Future Years Defense Program "Engine Room." Colonel Francisco also directed Compass Call, worked operations support in the Air Intelligence Agency, established the Space Warfare Center, managed the Air Force's Tactical Exploitation of National Capabilities Program, and oversaw innovation in the National Reconnaissance Office's Directorate of Military Support. Since 1995 he has consulted with industry and labs on space and modern warfare, founded the concept of "five-minute war," and increased technical and tactical collaboration across the national and service ISR communities.

A Seat at the Table

Beyond the Air Component Coordination Element

Lt Gen Mike Hostage, USAF

Of course, I know where [the bombs] are falling. They are falling in the right place. Go ask George Kenney where it is.

—Gen Douglas MacArthur, 20 January 1943

Planning and executing combat operations demand trust and coordination at all levels—especially at the senior-leader level. Clearly, General MacArthur trusted Lt Gen George Kenney, the senior Airman in the Pacific during World War II. Their relationship and the success of MacArthur's Pacific campaign stemmed from frequent and meaningful interaction between the two men and their staffs, underwritten by access to resources and authorities. As MacArthur island-hopped through the Pacific, Kenney moved his headquarters forward, bringing combat capability and resources with him and directing the employment of airpower along the way.[1] The relocation of headquarters proved critical at a time when the ability to communicate and interact was primarily a function of distance.

Although modern technology significantly reduces the need for close proximity to sustain communication or to command and control airpower, it comes with a cost. Today's state-of-the-art combined air and space operations center (CAOC) and its communications capabilities allow Airmen to make full use of the inherent flexibility, speed, range, and mobility of airpower. The CAOC, however, lacks the portability that would allow a combined force air component commander (CFACC) to colocate with every ground commander; the price tag for such redundancy in both personnel and equipment far exceeds the benefits. In addition, commanding and controlling airpower in multiple joint operating areas does not

allow the theater CFACC to stand side by side with each ground commander—a fact that has hampered discourse and cooperation with our joint partners.

The Air Force's recognition of this disconnect in 2003 led to implementation of the air component coordination element (ACCE). The ACCE construct solved the proximity problem by placing a senior Airman at the joint force commander's (JFC) headquarters to facilitate integration and offer an Airman's perspective from planning through execution. However, my observation, since 2003, has found the ACCE construct wanting.

Liaison and coordination did not prove sufficient to satisfy the JFC. Effective integration at all levels requires more than close proximity. The ACCE needed, and I gave him, sufficient staff to integrate at all levels, responsibility for forces assigned to the joint operations area (JOA), and the necessary authorities to respond to the JFC's needs.

This approach is not new; it shares much with the successful relationships of MacArthur and Kenney in the Pacific or of Gen George Patton and his senior Airman, Brig Gen O. P. Weyland, during the drive through southern France in 1944.[2] In both cases, the senior Airman commanded the resources and appropriate authorities to support his ground commander.

To improve the integration of airpower with the ground scheme of maneuver, I empowered the ACCE-Afghanistan and ACCE-Iraq through a verbal order in 2009.[3] Specifically, I delegated limited operational control and full administrative control over US Air Forces Central (AFCENT) forces in each JOA to the respective ACCE.[4]

Although the tactical control of theaterwide air assets remains at the AFCENT CAOC, the ACCE has authority to organize forces, recommend courses of action, and provide authoritative direction to the subordinate air expeditionary wings.[5] The ACCE also ensures that inputs to the air tasking order meet the needs of the operation or plan. Reachback to the Air Force forces staff and the CAOC permits the ACCE to accomplish these tasks without having to maintain a large forward staff and robust command and control capability.

To remain flexible and best manage airpower across the Central Command theater, I provide each ACCE with a fragmentary order with commander's intent and mission type orders outlining the limits of his authorities. A critical element of this limit is my prerogative, as the theater CFACC, to reassign assets to meet theater-level or cross-JOA requirements.

One alternative to the approach I have suggested involves pushing a deputy CFACC forward. In the case of AFCENT, doing so would result in a CFACC in Iraq and another in Afghanistan—and possibly others. This idea may be appropriate for smaller operations, single-purpose missions (like a humanitarian-assistance operation or noncombatant evacuation), or multiple major combat operations that occur far enough apart to preclude the ability to swing assets between the two. In the first two instances, command and control of air operations likely does not require a CAOC. In the third, two simultaneous major combat operations may overwhelm the ability of a single CAOC to provide adequate command and control in both fights.

In AFCENT today, however, the ability to swing air assets from one JOA to another; to maximize limited airlift, air refueling, and intelligence, surveillance, and reconnaissance capabilities; to meet competing theater demands outside Iraq and Afghanistan; and to leverage the full capabilities of the CAOC militates against the CFACC-forward approach. I also believe that this approach diminishes the important theaterwide perspective that a theater CFACC brings to the fight. This broader perspective is representative of the unique viewpoint that Airmen have long contributed to the planning and execution of joint operations.

Over the last year, I have become convinced that ACCE empowerment was the right approach (it works), and I am now moving to align our model properly and institutionalize it in a meaningful way in our doctrine, education, and training. My intent,

as I have emphasized to Airmen throughout the theater and especially to the ACCEs, is to make the ground commander successful. I have seen positive results from this change as the ACCEs have been more fully integrated in operational planning and during staff deliberations, allowing them to provide world-class air support.

Airmen must have a seat at the table when the JFC organizes, plans, and executes operations. Guaranteeing that seat requires meaningful daily interaction and the resources and authorities to make a difference. Empowering the ACCE is the key to this meaningful interaction and improved execution. I believe that our doctrine must evolve to accommodate this approach where it makes sense, and I look forward to that doctrinal dialogue in the months ahead. ✪

Notes

1. Kenney relocated his headquarters from Brisbane, Australia, to New Guinea and, later, the Philippines during the war.

2. Carlo D'Este, *Patton: A Genius for War* (New York: HarperCollins, 1995), 637; and Gen O. P. Weyland, oral history interview by Dr. James C. Hasdorff and Brig Gen Noel F. Parrish, 19 November 1974, K239.0512-813, US Air Force Historical Research Agency, Maxwell AFB, AL. The command relationship between Weyland and Patton was the same supporting-supported construct in use today. Weyland's chain of command actually went through Ninth Air Force (first, Maj Gen Lewis Brereton and, later, Maj Gen Hoyt S. Vandenberg) to Air Marshal Trafford Leigh-Mallory, the commander of Allied Air Expeditionary Forces.

3. I recently redesignated the ACCE-A as the 9th Air Expeditionary Task Force-Afghanistan, or 9 AETF-A. For Iraq, redesignation of the ACCE-I as the 9 AETF-I will follow.

4. Delegation of these authorities can be withdrawn and exercised by the AFCENT commander in his role as theater joint force air component commander (JFACC) / commander of Air Force forces when needed to satisfy theaterwide requirements and to ensure that actions within one JOA do not adversely affect broader theater or outside-of-area concerns.

5. Tactical control (TACON) is the "detailed direction and control of movements or maneuvers within the operational area necessary to accomplish missions or tasks assigned. [TACON] is inherent in operational control." Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through 31 July 2010), 457. In this case, the theater JFACC reserves TACON and exercises control over the execution of theaterwide air operations through the CAOC.

Lt Gen Mike Hostage, USAF

Lieutenant General Hostage (BSME, Duke University) is commander of US Air Forces Central Command, Southwest Asia. As the air component commander for US Central Command, the general is responsible for developing contingency plans and conducting air operations in a 20-nation area of responsibility covering Central and Southwest Asia. General Hostage received his commission as a distinguished graduate of the ROTC program at Duke University, Durham, North Carolina, in 1977. A distinguished graduate of pilot training in 1979, he has served as aide to the chief of staff of the Air Force, senior military assistant to the secretary of the Air Force, Joint Staff political-military planner, and director of requirements and integration at Joint Forces Command. He has served as director of air, space, and information operations and director of plans and programs at Air Education and Training Command as well as assistant director of operations at Air Combat Command. He has commanded a fighter squadron, operations group, and three wings. Prior to assuming his current position, he was vice-commander of Pacific Air Forces, Hickam AFB, Hawaii. General Hostage is a graduate of Squadron Officer School, Air Command and Staff College, Air War College, and the USAF Fighter Weapons School. A command pilot with over 4,000 flying hours, he has logged more than 600 combat hours in Operations Desert Shield, Desert Storm, Southern Watch, Iraqi Freedom, Enduring Freedom, and New Dawn.

Bringing Balance to the Force

Lt Col Paul D. Berg, USAF, Chief, Professional Journals

The Air Force needs a force structure appropriate for the world of tomorrow. That structure will include remotely piloted aircraft (RPA) and manned aircraft as well as those optimized for either conventional or irregular warfare (IW). Finding an acceptable balance among these types of platforms will be challenging.

Airmen have always faced force structure decisions, and previous decisions influence today's choices. During the Cold War, Airmen emphasized the use of sophisticated air and space forces to contend with the technologically advanced Soviet military, but episodes such as the Vietnam War periodically spurred the Air Force to acquire simpler aircraft to conduct IW. Once those episodes ended, the service consistently reverted to advanced platforms designed for conventional warfare. The Gulf War of 1991 seemed a triumphant vindication of the Air Force's Cold War–era choices in force structure; however, the remainder of the 1990s was an ambiguous time for Airmen trying to adapt to a fast-changing post–Cold War world. Steep cuts in the service's inventory proceeded despite this strategic uncertainty. By default, much of the Air Force's force structure during the 1990s was left over from the Cold War. Protracted no-fly-zone enforcement operations in the Balkans and Iraq wore out airframes more quickly than planned. Repairs consumed resources that the service might have used to procure new aircraft.

Operation Allied Force in 1999 was an airpower success, but the interwar era of the 1990s ended dramatically with the Pearl Harbor–like attacks of 11 September 2001. To deal with shadowy international terrorist organizations, the Air Force needed unconventional air and space power capabilities; yet, it also had to maintain conventional forces in the event of confrontations with peer-competitor nations such as China. Initially, conventional aircraft proved extremely productive against the Afghan Taliban in 2001 and the Iraqi military in 2003, but their effectiveness declined as those conflicts morphed into festering counterinsurgencies. As enemy targets dwindled, the financial cost of keeping high-performance aircraft loitering indefinitely in the battlespace became prohibitive. Civilian casualties caused by air strikes also entailed high political costs.

Innovative Airmen adapted to these changing conditions despite countervailing institutional norms. The use of RPAs increased tremendously, at first as a cost-effective way of gathering intelligence, surveillance, and reconnaissance data, but later as a means of conducting surgical air strikes. RPAs defy the Air Force's traditional pilot ethos, yet their deployment is proceeding apace. The equilibrium point between RPAs and manned aircraft remains unknown, but the service needs both types of platforms. It is also struggling to find the proper balance between aircraft intended for conventional warfare and those optimized for IW. The former can perform IW missions to some degree, but the latter may have low utility during conventional wars. Whether the service will follow its habit of buying advanced aircraft such as the F-22 and shunning propeller-driven Tucano-like IW aircraft remains to be seen. *Air and Space Power Journal*, the professional journal of the Air Force, dedicates this issue to promoting discussion about how best to balance the service's force structure to confront tomorrow's challenges. ✪

We encourage you to e-mail your comments to us at aspj@maxwell.af.mil. We reserve the right to edit your remarks.

LORENZ ON LEADERSHIP: PART 3

Gen Stephen Lorenz hit a home run with his article "Lorenz on Leadership: Part 3" (Fall 2010). Although he may be the last person to seek the next day's news headline, you can be sure that the whole team was at home plate congratulating him for his performance. Like baseball players, Air Force personnel have diverse positions and talents but must operate as a team to be effective. The General Lorenzes of our Air Force inspire and foster something that transcends our individual greatness. Each of the "Lorenz on Leadership" articles cuts to the reality of leadership principles and helps me personally identify with fundamental ideas that ultimately deal with challenging and inspiring people. As a commander, I have tried to apply some of these ideas by establishing individual and team-development plans for our squadron's enlisted, officer, and civilian personnel. We call the program "Project Lorenz" because these plans reflect the principles and common sense that he promotes. Once again, thank you, General Lorenz, for your service and dedication to the Air Force and its most important resource—Airmen.

Lt Col Patrick A. Brown, USAF
Wright-Patterson AFB, Ohio

COLOMBIA CAN TEACH AFGHANISTAN (AND THE UNITED STATES) HOW TO WIN

In response to Robert Haddick's article "Colombia Can Teach Afghanistan (and the United States) How to Win" (Summer 2010), I contend that US support to nations engaged in counterinsurgency is really about establishing a durable social equilibrium. Preoccupation with the term *win* colors far too many articles purporting to have a solution for such complex problems.

We entered the small war in Colombia early enough to realize large leverage from a small investment; however, we haven't brought closure to the large war (politically if not militarily) in Afghanistan. Although Mr. Haddick's proposal may provide enough social equilibrium for us to withdraw from Afghanistan, doing so may undermine our national interest in a strong central Afghan government. Would that outcome amount to "winning" after eight years? I would simply characterize it as being practical.

Rick Bennett
Joint Warfighting Center, Suffolk, Virginia

I've worked with Latin American military forces, and they are always eager to learn from our operations. I believe it is equally important for us to learn from them. Articles like Robert Haddick's can have a great impact on our strategy if we read them at the appropriate level. I feel that for many years the US Air Force has neglected Latin American relations, so it's time to begin looking at how we can improve operations, and eventually democracy, in places closer to home.

Capt Pedro E. Gonzalez, USAF
Davis-Monthan AFB, Arizona

I read Mr. Haddick's article with great interest, but I cannot help noticing the differences between Colombia and Afghanistan. On the one hand, Colombia is a democracy, and the people feel that they are a nation. On the other hand, there is no central power in Afghanistan; the leadership is more tribal than central; and the tribes possess autonomy and aspirations that have nothing to do with the central government. This situation translates into the fact that the power of the Afghan government is limited to a few cities. In the rest of the country, alliances change constantly. We also have to consider that in Colombia, despite everything, the people have a Western way

of thinking, but in Afghanistan their way of thinking is very different from our Western idiosyncrasies. Unfortunately, the situation will continue to deteriorate slowly as US and North Atlantic Treaty Organization forces leave the country, as was the case when the Soviets left.

Marcos Daniel Funes
Buenos Aires, Argentina

Editor's Note: Mr. Funes read the Spanish version of this article, available at http://www.airpower.maxwell.af.mil/apjinternational/apj-s/2010/1tri10/haddick.html.

COLOMBIA CAN TEACH AFGHANISTAN (AND THE UNITED STATES) HOW TO WIN: THE AUTHOR RESPONDS

Mr. Funes points out some notable differences between Colombia and Afghanistan. I agree that significant cultural and historical differences exist between the two countries, a fact that I mentioned in my article. We should also take note of the similarities between the two insurgencies, which I also discussed.

Mr. Funes points out the more tribal and decentralized nature of Afghan society. I believe that these characteristics support the argument for employing a Colombia-type approach to counterinsurgency in Afghanistan. Colombia's home-guard platoon program, which seems appropriate for a decentralized Afghanistan, is now increasingly popular with the staff of the International Security Assistance Force (ISAF). Afghanistan's apparent cultural resistance to a strong central government argues against the ISAF's current plan to establish a large general-purpose national army and national police force. Better to follow Colombia's example again and build a smaller—but elite and specialized—helicopter-mobile army.

Finally, we should recall how chaotic Colombia was in the 1990s. Despite ongoing security challenges, that country has improved considerably since those dark days, demonstrating that wise policies and good leadership can make a difference—hopefully, even in Afghanistan.

Robert Haddick
Bethesda, Maryland

LEADING AND MANAGING THROUGH INFLUENCE: CHALLENGES AND RESPONSES

Dr. Raymond Shulstad and Lt Col Richard Mael's article "Leading and Managing through Influence: Challenges and Responses" (Summer 2010) has significant value for executive officers and others serving in similar jobs. Having twice served as an executive officer, I can attest that almost every day I faced challenges similar to those described in the article.

An executive officer for a wing or group commander has no direct authority over unit commanders, nor does he or she really speak for the wing or group commander. Nevertheless, every day the executive officer either assists in synchronizing projects across the wing or group or helps unit commanders and their appointed project officers and senior noncommissioned officers stay "on track" with myriad administrative and operational tasks.

In my opinion, the main job of any group or wing commander is to set the mission, vision, and goals for the organization; maintain situational awareness by strategically monitoring the internal and external environments; secure resources to support the existing mission; obtain additional resources for new missions; and, most importantly, push back against unnecessary taskings. To attain those objectives, effective executive officers can follow the advice of Dr. Shulstad and Lieutenant Colonel Mael by (1) obtaining commitment, (2) taking charge, (3) securing cooperation, (4) opening and maintaining lines of communication, (5) building trust and respect, (6) removing barriers, and (7) building and executing plans.

Lt Col Jose Angeles, USAF
McGuire AFB, New Jersey

In air combat, "the merge" occurs when opposing aircraft meet and pass each other. Then they usually "mix it up." In a similar spirit, Air and Space Power Journal*'s "Merge" articles present contending ideas. Readers are free to join the intellectual battlespace. Please send comments to aspj@maxwell.af.mil.*

The Mutable Nature of War

Col Phillip S. Meilinger, USAF, Retired*

Carl von Clausewitz, the Prussian general and academic who died nearly two centuries ago, authored what many consider the most brilliant treatise ever written about war. Among other things, he discussed the nature of war, which he also referred to as the "essence," "culture," or "atmosphere of war." To Clausewitz, this nature was timeless and immutable. Time and again he referred to war as combat, fighting, and bloodshed. He wanted to make clear that war followed no easy paths, continually instructing his readers that combat and violence comprised the nature of war and that, for the individual soldier, war was hell:

> War is an act of force, and there is no logical limit to the application of that force. . . .
>
> . . . War is a pulsation of violence. . . .
>
> . . . It is inherent in the very concept of war that everything that occurs *must originally derive from combat* (emphasis in original). . . .
>
> War is the realm of physical exertion and suffering. . . .
>
> Danger, physical exertion, intelligence, and friction [are] the elements that coalesce to form the atmosphere of war. . . .
>
> Every engagement is a bloody and destructive test of physical and moral strength. . . .
>
> . . . It is always true that the character of battle, like its name, is slaughter [*Schlact*], and its price is blood.[1]

These are examples of the dozens of such statements made by Clausewitz to define his subject. His work is a relentless hammering of these ideas, and he denigrated individuals who believed that war could be won without the slaughter: "Kind-hearted people might of course think there was some ingenious way to disarm or defeat an enemy without too much bloodshed, and might imagine this is the true goal of the art of war. Pleasant as it sounds, it is a fallacy that must be exposed."[2] This thesis implies a fundamental reliance on the individual soldier and a consequent devaluation of technology: Clausewitz focused on morale and fighting spirit. This stance is perhaps understandable because the Napoleonic warfare that he witnessed and that forms the basis of his work was largely devoid of technological innovation. Although considered a "revolution in military affairs," warfare of the Napoleonic era differed little, technologically, from that of Frederick the Great a half century earlier. The brilliance of the Corsican lay in his organization, strategy, mobility, and audacity.[3]

The beliefs of Clausewitz regarding the nature of war have influenced many military historians, theorists, Soldiers, and Marines. For example, John A. Lynn cautions his readers not to "forget that the ultimate fact of military history is combat, actually fighting, with all its danger and its heavy costs."[4] Victor Davis Hanson echoes this

*The author retired after 30 years in the Air Force and six years as a defense analyst in Washington, DC.

view, writing that "military history must never stray from the tragic story of killing, which is ultimately found only in battle." To him, "wars are the sum of battles."[5] Another eminent military historian, Martin van Creveld, says much the same thing. Noting war's timelessness and immutable character, he writes, "In many ways it has remained essentially the same at all times and in [all] places." To van Creveld, the essence of war involves danger, risk, destructiveness, selflessness, hardship, and even exhilaration.[6] Importantly, however, not all military historians agree with the Prussian theorist. According to Basil H. Liddell Hart, a lifelong skeptic of Clausewitz, "The spirit cannot win battles when the body has been killed through failure to provide it with up-to-date weapons."[7]

The US Army supports the Clausewitzian view of war. Writing about that service's self-image, Adrian Lewis notes that the Army views "the primary instrument for the conduct of battles" as "a soldier armed with an individual weapon" and that "the principal mission of the Army" is to "fight the nation's wars by closing with the enemy and destroying his main Army in battle." Lewis concludes that, according to the Army, "man is the dominant instrument on the battlefield."[8] Although one of the Army's doctrine manuals noted the move towards more capable technology, it quickly dismissed such a trend: "Warfare remains a test of the soldier's will, courage, endurance, and skill. Freezing rain, muddied foxholes, blistering heat, physical exertion, and imminent danger will remain the domain of the soldier."[9] The current field manual dealing with counterinsurgency echoes this view, noting that war in the twenty-first century "retains many of the characteristics it has exhibited since ancient times," describing war as "a violent clash of interests" and positing the need "to generate enough violence" to achieve objectives.[10] America's other ground army takes a similar view.

The US Marine Corps' basic doctrine manual, Fleet Marine Force Manual 1, *Warfighting*, declares that "the basic nature of war is constant," defining this nature as "a violent clash between two hostile, independent, and irreconcilable wills, each trying to impose itself on the other." Referring to war as "organized violence," it cautions that some people would try to trick us into believing otherwise but that we shouldn't be deceived: "The violent essence of war will never change. Any study of war that neglects this characteristic is misleading and incomplete."[11]

Marine Corps generals have been inculcated in this belief, one retired lieutenant general arguing that "the fundamental nature of war hasn't changed, won't change, and, in fact, can't change. . . . Nothing has happened that's going to change the fundamental elements of war. The nature of war is immutable." Dismissive of technology that arguably has altered the nature of war, he says, "My experience has been that those who focus on the technology, the science, tend towards sloganeering." To him, new ideas and revolutionary doctrines of war such as network-centric warfare or information dominance are mere semantic sleight of hand: "You could fill a book with all of these slogans." Instead, the general insists that war is a "terrible, uncertain, chaotic, bloody business" and that anyone who even attempts to devise methods that will reduce or eliminate such calamities is "very shallow" and "fundamentally flawed." To him, boots on the ground represent the essence of war. He argues that if we had used more of them in Iraq at the beginning of Operation Iraqi Freedom, "you might have convinced a lot of people that the war was over at that time."[12] He is not the only Marine to feel strongly about throwing more human beings instead of machines at the problem. According to the current head of US Central Command, "There comes a point when a country puts young folks at risk because it becomes important for them to defend a certain way of life. . . . From a Marine point of view, we can't lose our honor by failing to put our own skin on the line."[13]

One can only hope that his or her own son or daughter never serves under the

likes of people such as the generals mentioned above, who believe that *their* "honor" requires placing the lives of American troops at needless risk. These historians and generals most seriously err in equating land warfare—specifically, conventional battle as once practiced—with war. This error reflects institutional bias and downplays the role of technology.

One of the most effective and ancient aspects of naval war is the blockade. A form of economic warfare not dependent on a bloody clash of armed men, this traditional weapon of sea warfare attempts to disrupt and strangle an enemy's commerce. All

These historians and generals most seriously err in equating land warfare—specifically, conventional battle as once practiced—with war. This error reflects institutional bias and downplays the role of technology.

countries—and now nonstate actors as well—require money and resources with which to wage war. A blockade—as well as its close cousin the sanction—seeks to control the sea lines of communications, thereby reducing money and resources available to an adversary so that he can no longer prosecute the war effectively. One of the great naval theorists, Sir Julian Corbett, succinctly remarked that "the object of naval warfare is the control of communications, and not, as in land warfare, the conquest of territory. The difference is fundamental."[14] It is indeed.

Nations that possess a sizable fleet but a small army have often used the naval blockade as their preferred weapon. In World War I, for example, Britain led the Allied powers in establishing a starvation blockade against the Central Powers—Germany and Austria-Hungary. According to the British official history of this action, more than 800,000 German civilians died as a direct result of the blockade.[15] During the 1990s, sanctions imposed by the United Nations to pressure Saddam Hussein also produced such odious results in Iraq. These sanctions killed over one million Iraqi civilians—the majority of them women and children.[16] Coercive measures imposed on Haiti between 1991 and 1993 in an attempt to push out the military junta in power proved similarly horrific, devastating the Haitian economy: unemployment soared to 70 percent, inflation doubled, and gross domestic product dropped 15 percent. Moreover, 1,000 children died each month as a direct result of the legally levied sanctions.[17] Small wonder that two observers wrote a critical and cynical article on the matter titled "Sanctions of Mass Destruction."[18]

This was war, and it was extremely deadly, but it involved no battles and no violent clashes of arms. If violence does occur during a blockade or the enforcement of sanctions, it generally takes place far out at sea or at a roadblock: the civilians, the real targets, die quietly and bloodlessly.

A similarly bloodless yet potentially devastating new method of war involves cyberspace. Adversaries can hack into computers, implant viruses and worms, shut down systems, or order bogus commands and actions. In May 2007, Estonia came under attack, presumably by Russia, and experienced problems with its computers in businesses, banks, telecommunications, the media, and the government. In August 2008, cyber attacks were launched against Georgia, again probably by Russia, at the same time Russian military forces invaded the country. The cyber assaults concentrated primarily on Georgia's ability to access the outside world via the Internet and media in order

to tell its side of the story in the military/political dispute.[19] In November 2008, assaulters struck Pentagon computers, seeking "remotely to take control of computers and rifle their files." In July 2009, a cyber barrage, presumably by North Korea, shut down tens of thousands of government and military computers in South Korea.[20] The Congressional Research Service and the Government Accountability Office have studied the issue on several occasions and posted repeated warnings that the US government is ill prepared to defend itself against a robust cyber attack. They note that the number of reported cyber incidents against the United States has more than tripled in recent years. Although admitting that "there has been no published report of a coordinated cyberattack [*sic*] launched against the critical infrastructure by a terrorist or terrorist group," they fear that hitherto unsophisticated terrorist attempts will lead to complacency. Both agencies are especially concerned about the danger of cyber attack posed by China and Iran.[21] One report sees China using coordinated cyber and kinetic strikes against a foe's networked information systems. The Chinese have adopted a formal strategy for this offensive system that they term "Integrated Network Electronic Warfare."[22]

Although massive cyber attacks against a nation have not yet occurred—with the possible exception of the Russian operations against Georgia—the above incidents reveal a probing approach and learning curve that bode ill for the future. Nightmare scenarios abound, and it is not difficult to imagine a situation in the near future when cyber attacks occur simultaneously with kinetic strikes in a major assault. The nature of such cyber offensives could include not only degradation of everyday services such as automated teller machines, traffic lights, and power grids, but also more serious assaults on the banking and financial systems, stock market, and air traffic control radars. It is logical to assume that military facilities such as air defense systems and command and control networks would also be targeted.

These cyber attacks would originate with individuals in shirt sleeves, perhaps civilians, sitting at computer terminals thousands of miles from the places that would feel the effects of their operations. These offensives would involve no risk and no bloodshed, yet they could wreak havoc on a nation's economy and way of life.

The notion of battle as the province of fear, anxiety, and exhaustion is outdated because technology has dramatically altered this archaic situation. Modern air warfare has proven remarkably bloodless for American Airmen. Since the Vietnam War ended, the US Air Force has flown hundreds of thousands of combat sorties yet has suffered only slight losses. Since 1973 the service has lost a total of 18 manned aircraft in combat (costing the lives of 20 crew members), an astoundingly low rate.[23] In most cases, modern air war as practiced by the United States and its close allies is not the realm of death, exhaustion, blood, and fear—at least not to the degree inherent in traditional forms of warfare.

Then there are the drones. In 2001 the United States put precision-guided missiles on remotely piloted aircraft (RPA) and launched them at high-ranking al-Qaeda officials in Afghanistan with stunning success.[24] Predators and Reapers launching Hellfire missiles are flown and commanded by pilots sitting as far distant from the battlefield as Creech AFB, Nevada.[25] Such strike missions have become commonplace. Military officers report for work at locations in the United States and, during a typical shift, fly RPA combat sorties halfway around the world. On many occasions, the RPA sensors locate, identify, and track terrorists and enemy combatants. Sometimes they fire missiles at those targets in order to destroy them. The drone pilots leave work and return home to their families without having experienced personal danger, risk, fear, physical exertion, overwhelming thirst, hunger, or exhaustion. And the drones themselves can be very courageous.

Do not misunderstand. I am no way denigrating the efforts or courage of either our valiant combat crew members or the drone pilots. It is a very *good thing* that they can practice war in a way that severely limits their exposure to death and casualties. That is as it should be. As one fighter pilot told me, "If you're in a fair fight, you didn't plan it properly." The role and *duty* of military planners from all services should involve doing everything in their power to plan operations that limit the exposure of American forces to danger. Deliberately risking the lives of America's sons and daughters is not honorable—it is criminal.

The nature of war is mutable. Warfare in the modern world remains deadly and destructive, but it need not be violent or bloody. The fundamental aspect of war in centuries past may have taken the form of sanguinary battles between infantrymen, but that is no longer necessarily the case. Traditional sea warfare, as well as present-day cyber operations, can become enormously deadly and destructive—but neither violent nor bloody. Technology also has helped ensure the remarkable effectiveness and efficiency of modern air warfare. Loss of aircraft and the lives of crew members has dropped exponentially over the past several decades. Moreover, this decline in casualties has been the rule not only for the United States but also for enemies on the receiving end of our air strikes.

Operations Desert Storm, Deliberate Force, Allied Force, Enduring Freedom, and Iraqi Freedom have produced a remarkably small civilian casualty toll due to air attack, given the bomb tonnage dropped. Indeed, Marc Garlasco of Human Rights Watch refers to airpower as "probably the most discriminating weapon that exists."[26] One report by that organization regarding the initial stages of Iraqi Freedom states that "the ground war caused the vast majority of the deaths," attributing, for example, 90 percent of all civilian casualties to ground-launched cluster-bomb munitions used at al-Hilla.[27]

Iraq Body Count (IBC), which provides an account of civilian casualties in Iraq, has determined that around 85,000 Iraqi civilians died as a result of the war, through 2008. Air strikes caused about 9,500 of these—11.2 percent of the total. Significantly, since 2005 the war has seen a decrease in both the number of civilian deaths and the percentage of deaths attributable to air attack—to 2.6 percent. In other words, IBC calculates that over 97 percent of the 60,922 Iraqi civilians killed since 2005 have fallen victim to ground warfare.[28] An examination of the war in Afghanistan yields comparable statistics. Specifically, a recent study shows that of the 152 casualties among women and children caused by coalition forces between January 2009 and March 2010, only nine (6 percent) were the result of air strikes. In fact, coalition traffic accidents claimed nearly three times that many women and children![29] Regrettably, the mass media often depict airpower as violent and graphic but consider a blockade nonviolent and bloodless—despite the number of people who actually die in both military actions. Tellingly, a RAND study refers to airpower, especially any associated collateral damage, as "mediagenic," noting that the more graphic medium of television is four times more likely than its print counterpart to report incidents of collateral damage.[30]

Can we always expect such dramatic effectiveness at such low cost? Of course not. But in facing any crisis, our leaders should take as their *entering premise* the goal of attaining such results. We are not condemned to suffer horrendous death, destruction, and "*Schlact*" in the conduct of military operations. Technology, especially as exemplified by modern air warfare, shows that we can aspire to a higher objective. The old canard that considers the nature of war immutable, that assumes it was the same for one of Alexander's hoplites as for a grunt in Afghanistan, is simply not true. War has changed, and so has its nature. ✪

West Chicago, Illinois

Notes

1. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 77, 87, 95, 101, 122, 231, 259.

2. Ibid., 75.

3. The best study of Napoleon and his methodology of war remains David G. Chandler's *The Campaigns of Napoleon* (New York: Macmillan, 1966).

4. John A. Lynn, *Battle: A History of Combat and Culture* (Boulder, CO: Westview Press, 2003), xv.

5. Victor Davis Hanson, *Carnage and Culture: Landmark Battles in the Rise of Western Power* (New York: Doubleday, 2001), 7.

6. Martin van Creveld, *The Culture of War* (New York: Presidio Press, 2008), xv and chap. 6, "The Joy of Combat."

7. Basil H. Liddell Hart, *Thoughts on War* (London: Faber and Faber, 1944), 158.

8. Adrian R. Lewis, *The American Culture of War: The History of U.S. Military Force from World War II to Operation Iraqi Freedom* (New York: Routledge, 2007), 40.

9. Field Manual (FM) 100-5, *Operations*, June 1993, 1-2.

10. FM 3-24 / Marine Corps Warfighting Publication 3-33.5, *Counterinsurgency*, December 2006, 1-1.

11. Fleet Marine Force Manual 1, *Warfighting*, 6 March 1989, chap. 1, "The Nature of War," specifically, 13, 3, 11.

12. "The Immutable Nature of War" [interview with Lt Gen Paul Van Riper], *NOVA*, 17 December 2003, http://www.pbs.org/wgbh/nova/wartech/nature.html.

13. "Panel Touts Robots' Future Combat Role," *Virginian-Pilot*, 28 January 2009, 13, http://www.military.com/news/article/panel-touts-robots-future-combat-role.html?ESRC=topstories.RSS.

14. Julian S. Corbett, *Some Principles of Maritime Strategy* (Annapolis, MD: Naval Institute Press, 1988), 94.

15. A. C. Bell, *A History of the Blockade of Germany and of the Countries Associated with Her in the Great War, Austria-Hungary, Bulgaria, and Turkey, 1914–1918* (London: Her Majesty's Stationery Office, 1937), 672. See also Lt Louis Guichard, *The Naval Blockade, 1914–1918*, trans. and ed. Christopher R. Turner (New York: D. Appleton, 1930), 294. Guichard notes that the blockade remained in place for two years *after* the armistice to pressure the Germans into signing a peace treaty and making the required reparations payments.

16. UNICEF, *Child and Maternal Mortality Survey, 1999: Preliminary Report*, July 1999, 10; and Fourth Freedom Forum, *Morbidity and Mortality among Iraqi Children from 1990 through 1998: Assessing the Impact of the Gulf War and Economic Sanctions*, March 1999, 1, http://www.fourthfreedom.org/Applications/cms.php?page_id=7.

17. David E. Weekman, "Sanctions: The Invisible Hand of Statecraft," *Strategic Review* 26 (Winter 1998): 40.

18. John Mueller and Karl Mueller, "Sanctions of Mass Destruction," *Foreign Affairs* 78, no. 3 (May/June 1999): 43–53.

19. Robert A. Miller and Daniel T. Kuehl, "Cyberspace and the 'First Battle' in 21st-Century War," *Defense Horizons*, no. 68 (September 2009): 3, http://www.ndu.edu/CTNSP/docUploaded/DH68.pdf.

20. Rebecca Grant, "The Cyber Menace," *Air Force Magazine* 92, no. 3 (March 2009): 24–25; and Siobhan Gorman and Evan Ramstad, "Cyber Blitz Hits U.S., Korea," *Wall Street Journal*, 9 July 2009, http://online.wsj.com/article/SB124701806176209691.html.

21. John Rollins and Clay Wilson, *Terrorist Capabilities for Cyberattack: Overview and Policy Issues*, CRS Report for Congress RL33123 (Washington, DC: Congressional Research Service, 22 January 2007), 1–4, 10–11, http://www.fas.org/sgp/crs/terror/RL33123.pdf; and *Homeland Security: DHS's Progress and Challenges in Key Areas of Maritime, Aviation, and Cybersecurity*, GAO-10-106 (Washington, DC: Government Accountability Office, 2 December 2009), 8, 18, http://www.gao.gov/new.items/d10106.pdf.

22. Bryan Krekel, *Capability of the People's Republic of China to Conduct Cyber Warfare and Computer Network Exploitation*, Prepared for the US-China Economic and Security Review Commission (McLean, VA: Northrop Grumman Corporation, 9 October 2009), 6, http://www.uscc.gov/researchpapers/2009/NorthropGrumman_PRC_Cyber_Paper_FINAL_Approved%20Report_16Oct2009.pdf.

23. Data derived from the *Gulf War Air Power Survey*, and various fact sheets from US Air Forces in Europe, US Air Forces Central, and Headquarters US Air Force. For example, the Air Force flew 37,567 combat sorties in Operation Desert Storm; 1,066 in Operation Deliberate Force; over 189,000 in Operations Northern and Southern Watch; 24,345 in Operation Enduring Freedom / Operation Iraqi Freedom during 2005; 38,026 in Enduring Freedom / Iraqi Freedom during 2008, and so forth.

24. The US Air Force began the program for arming Predator RPAs in 2000. The Central Intelligence Agency soon joined the effort. For the background, see *The 9/11 Commission Report: Final Report of the*

National Commission on Terrorist Attacks upon the United States (Washington, DC: US Government Printing Office, 22 July 2004), 210–13. For the Predator's effectiveness against terrorists, see Michael Evans, "Death from Above: How Predator Is Taking Its Toll on al-Qaeda," *Times*, 3 January 2009, http://www.timesonline.co.uk/tol/news/world/middle_east/article5435471.ece.

25. Predator/Reaper operations have dual control: teams in-theater launch and recover them, but bases in the United States control them during the flight itself.

26. Quoted in Charles J. Dunlap Jr., "Lawfare: A Decisive Element of 21st-Century Conflicts?," *Joint Force Quarterly* 54 (3rd Quarter 2009): 36, http://www.abanet.org/natsecurity/readings/LawfareDunlapJun09.pdf.

27. *Off Target: The Conduct of the War and Civilian Casualties in Iraq* (New York: Human Rights Watch, 2003), 13, http://www.hrw.org/sites/default/files/reports/usa1203.pdf.

28. The Iraq Body Count Web site contains a number of studies dealing with Iraqi civilian deaths. For the early period, see "A Dossier of Civilian Casualties, 2003–2005." IBC continues to update its figures at http://www.iraqbodycount.org.

29. Luke N. Condra et al., *The Effects of Civilian Casualties in Afghanistan and Iraq*, NBER Working Paper 16152 (Cambridge, MA: National Bureau of Economic Research, July 2010), 9–13, 34, http://www.nber.org/papers/w16152.pdf. Of note, insurgents caused 86 percent of the 4,077 civilian casualties that occurred during that period.

30. Eric V. Larson and Bogdan Savych, *Misfortunes of War: Press and Public Reactions to Civilian Deaths in Wartime* (Santa Monica, CA: RAND, 2006), xx, 2, http://www.rand.org/pubs/monographs/2006/RAND_MG441.pdf.

US Nuclear Policy, 1945–68

Lessons from the Past for Dealing with the Emerging Threat from Iran

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The United States faces a potential transition in the balance of power and a growing concern over the threat of nuclear proliferation. The bipolar balance of power during the Cold War, though often tense and dangerous, kept states in check, thus maintaining a relatively stable international security environment with limited, or at least controlled, proliferation of nuclear technology. The current focus on the dynamics of international power, the threat of terrorism, and worries about nuclear proliferation calls for an examination of aspects of the post–World War II world and the early history of nuclear weapons. Such a review may provide insight into US policy options for addressing Iran's pursuit of nuclear technology.

The United States established the strategic nuclear policies in effect from 1945 to 1968 primarily to counter what the West perceived as a growing communist threat led by the Soviet Union. US policy makers of the time based this course of action on the technical developments, national interests, and dynamics of the international situation present in the security environment. This article describes and analyzes US nuclear policy from 1945 to 1968, uses the rational actor model to assess US actions during that period, and recommends a future nuclear policy that draws on our Cold War experience to deal with an emerging threat from Iran. By addressing lessons from the past, the article seeks to present a logical, yet likely controversial, course of action for the future.

Nuclear Policy, 1945–68

Four general strategic concepts characterize US nuclear policy between 1945 and 1968: strategic bombardment, massive retaliation, limited war (graduated deterrence), and mutually assured destruction. US nuclear policy originated with the decision to drop the atomic bomb on Hiroshima, Japan, in 1945—the first use of atomic weapons in the history of mankind. The bomb's devastating power leveled the city, killed roughly 66,000 people, and wounded an additional 69,000.[1]

Initially, some commentators viewed the atomic weapon as just another option in the American arsenal: more powerful, complicated, and expensive but nevertheless simply a bomb that the United States could employ in pursuit of strategic objectives.[2] The Air Force led the way in developing concepts for such employment, emphasizing strategic bombardment. From the Air Force's perspective, it could use strategic bombardment (especially with atomic munitions) to cripple an enemy in a relatively short time, thus enabling the fulfillment of aviation's grandest wartime promise: victory from the air. This vision became unrealistic, however, as scientists learned more about the bomb's long-term effects and as the United States lost its monopoly

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on atomic weapons to the Soviets in 1949. As noted by both Pres. Harry Truman and Adm Chester Nimitz, no weapon has ever been created for which a countermeasure could not be developed.[3] The effectiveness of strategic bombardment would likely suffer at the hands of heavy resistance from aircraft flying defensive counterair missions and from ground-based antiaircraft elements, as well as from the large, dispersed nature of targets within the Soviet Union.

Strategic bombardment eventually gave way to the doctrine of massive retaliation under Pres. Dwight Eisenhower. Based on the New Look strategy, this doctrine of deterrence called for the United States to respond to any act of aggression by the Soviets (or another adversary) with an even greater exertion of military force, up to and including the use of nuclear weapons.[4] National Security Council Report 68 had determined that the absence of arms control restraining the spread of nuclear technologies made necessary an assertive policy of rapid expansion of atomic weapons to build an arsenal that would deter aggression until the United States and its allies could develop a more robust conventional force.[5] Thus, the Eisenhower administration made nuclear weapons a formal option for any given conflict in order to counter what it considered growing communist aggression around the globe.

As the number and power of strategic nuclear weapons increased, it became increasingly clear that the consequences of a strategy of massive retaliation would prove too costly for the United States to bear. This perception led to development of the concept of limited nuclear war, which offered a counterstrategy to total war by allowing for the employment of lower levels of force in order to obtain limited objectives. Such a notion, however, ran contrary to most strategic thinking of the day and required more robust conventional alternatives to nuclear warfare—alternatives more expensive and time consuming to develop and field than nuclear weapons. Entering the discussion at this point, graduated deterrence asserted the acceptability of limited wars fought with tactical nuclear weapons—smaller weapons designed for use at the battlefield level. This scenario allowed for escalation according to the course of the action/counteraction cycle that develops on the battlefield or the nature of the conflict's objectives. Unfortunately, research and development during the early days of the Cold War did not give priority to small nuclear weapons; rather, the nuclear devices of the time were large, requiring heavy bombers or missiles for delivery. The incorporation of smaller battlefield nuclear weapons would enable deterrence through the threat of their use at the tactical level of warfare.

Toward the end of this period, the idea of mutually assured destruction—predicated on the assumption that nuclear-armed states must possess both a first- and second-strike capability—came to define the nuclear relationship between the United States and Soviet Union.[6] The range and accuracy of American delivery systems such as bombers, intercontinental ballistic missiles, and submarines assured the United States' first-strike capability. Moreover, US weapons deployments that exceeded Soviet capabilities to negate them completely in a first strike—as well as the survivability of submarines, hardening of missile silos, and round-the-clock airborne alert of bombers—guaranteed a second strike. The lethality, survivability, and visibility of the US nuclear triad ensured strategic nuclear readiness and served as a deterrent throughout the Cold War. Specifically, despite suffering an initial attack, either country could still respond in kind with enough force to deliver a significant counterblow, a prospect that kept them both in check. This tense yet stable balance of nuclear power prevented full-scale war between the two superpowers for the remainder of the Cold War.

Policy Analysis

Nuclear policies formulated by American leaders during the first part of the Cold War followed a pattern consistent with the tech-

nical developments, national interests, and dynamics of the international situation in effect at the time. From a technical perspective, as weapons grew more powerful and abundant, they became part of US war plans. Initially, two factors pushed atomic bombs to the forefront of American policy: the increased efficiency of bomb designs, which enabled us to produce more weapons from a given amount of fissile material, and development of the first long-range bomber, the B-36.[7] All other policies stemmed from the technical means that made them possible and a desire to be the first to field the latest technology in order to prevent an adversary from creating a capability gap that would destabilize the balance of power. In terms of national interests, the United States consistently produced additional nuclear weapons and delivery systems to meet what it perceived as a growing Soviet threat, or to respond to shifts in strategy. (For example, the United States developed hydrogen bombs to counter Soviet production of bigger bombs and to respond to an increased number of Soviet conventional forces in Europe.) Finally, as the international situation shifted and communism seemed ascendant in some areas (e.g., China, Korea, and Vietnam), the United States further emphasized its nuclear forces to increase the cost of communist expansion to unacceptable levels.

Application of the Rational Actor Model

A theoretical paradigm used for analyzing organizational behavior, the rational actor model examines behavioral choices in terms of cost/benefit analysis of the expected outcome.[8] This model deems governments rational if they pursue policies that generally maximize reward while minimizing cost. Graham Allison asserts that rational states must (1) act in a unitary manner, (2) calculate the risks and benefits of actions prior to engaging in them and then choose the most beneficial option, (3) recognize the reality of an anarchical international system, and (4) pursue security through power.[9] All of these traits are consistent with US nuclear policies from 1945 to 1968.

Specifically, the US government acted unitarily throughout the period by following a singular course of action once the president established a formal policy, despite internal debate among politicians, scientists, and military personnel. For example, even though the decision to develop the hydrogen bomb proved contentious, all government agencies moved to develop, produce, and field this weapon.[10] Additionally, policy makers consistently evaluated actions in terms of cost/benefit analyses. Economic, strategic, and technical factors all played a part in the development of US nuclear policies as well. For example, the decision to deploy tactical nuclear weapons in Europe was driven in part by the excessive cost to the United States and its North Atlantic Treaty Organization allies of fielding a conventional force to counter the Soviet presence there. Recognizing the inability of other states to provide for its national security throughout the Cold War, the United States established nuclear policy that reflected the development and deployment of more powerful and numerous nuclear weapons to ensure security in the face of growing threats from international powers such as the Soviet Union and China. Finally, the United States' efforts to secure international diplomatic, economic, and military power hinged on its nuclear arsenal. European and Asian allies relied heavily on America for their defense, thus creating a system of dependence that gave us considerable leverage around the globe.

The previous discussion shows that the United States acted in a rational manner to perceived threats posed by communism and nuclear proliferation from 1945 to 1968. From a contemporary perspective, not all decisions may appear the best possible, but political leaders made them with the most pertinent information available at the time. We must now address the question of whether the United States can make better nuclear policy decisions today, based on

lessons learned and an increased amount of information regarding the motivations, capabilities, and strategies of former adversaries. Can we apply such lessons to problematic states (e.g., Iran, North Korea, and Pakistan) to stabilize the international order, prevent war, and control nuclear proliferation? To answer that question, this article turns its attention to Iran.

Future Application

The United States frequently overestimated the Soviet Union's capabilities, portraying that country as a greater threat than it actually was.[11] Such thinking led to concerns about bomber and missile "gaps" as well as costly military spending to close them, generally fueling a greater degree of animosity than the reality of the situation warranted. Are we making the same mistake today with a state we suspect of pursuing nuclear weapons? More specifically, are the United States and its allies overestimating the threat that a nuclear-armed Iran would pose? Although the United States and Iran have a history of conflict and cooperation analogous to that of the United States and Soviet Union, Iran significantly lags the latter in terms of industrial, technical, and military capacities. Despite Iran's pursuit of nuclear technologies and the possibility of its fielding an operational nuclear weapon (or a viable option for one) in the near future, it is unlikely that Iran will pose a threat similar to that represented by the Soviets during the Cold War. The United States might consider a radical departure from its nuclear policy by following a line of thought proposed by Kenneth Waltz that actually allows Iran to acquire nuclear weapons. From Waltz's perspective, nuclear weapons enhance international stability by prohibitively increasing the cost of war.[12] A nuclear-armed Iran would acquire the international prestige, security, and regional leadership it desires yet would probably find itself unable to employ nuclear weapons effectively against the United States or a regional rival such as Israel; furthermore, the threat of nuclear retaliation would prevent it from transferring them to intermediaries (terrorist organizations).[13]

Throughout the Cold War, US nuclear forces and policies (the possible first use of nuclear weapons to counter Soviet conventional forces) created a credible deterrent to Soviet aggression in Europe.[14] The United States could likely produce the same deterrent effect on Iran, provided it makes its policies of reprisal for attack and defense of allies perfectly clear, and provided it maintains a healthy, robust, and credible nuclear deterrent capability.[15] By adding to these assumptions the development of an effective nuclear forensics apparatus to identify sponsors of nuclear-armed terrorists and the issuance of an unambiguous threat of retaliatory strikes against them, the United States should enjoy protection from both direct and indirect Iranian nuclear attacks.[16] We should apply to Iran the lesson which tells us that deterrence works but that overestimating or misunderstanding the enemy drains national treasure, pollutes the environment, and risks inadvertent war. Just as the Soviets seemed arguably more concerned with an invasion of their homeland from Europe than with the pursuit of global domination, so would Iran likely have more interest in acquiring prestige and security than in going to war with the United States. Western media widely publicizes Iranian president Mahmoud Ahmadinejad's derogatory comments about Israel (e.g., his statement that "Israel must be wiped off the map") and the regime's support for spreading Shiite revolutionary ideals (e.g., its founding of Hezbollah), but do such statements and behavior differ appreciably from Nikita Khrushchev's radical outbursts decrying capitalism and Western society?[17]

Iranian Rationality

Existing theories of deterrence depend upon the rationality of the parties involved; therefore, if Iran is not a rational actor, then

those theories may not represent an accurate framework from which to develop courses of action for dealing with that country. Considerable debate within the international community concerns Iran's perceived efforts to acquire nuclear weapons and the possible ramifications of such a move. Granted, Iran has a history of provocative action and confrontation with the West, but one can reasonably explain its acquisition of nuclear technologies (civil or military) in terms of normal state behavior, assuming a rational Iran and assuming the emergence of a multipolar world order in which rising states will attempt to cut into America's current share of international power. This changing world order will affect Iran because it will challenge the current balance of power, perhaps giving that country a greater span of influence within the Middle East than its Sunni rivals and Israel, all of whom have benefited from the United States' current status as the world's only superpower. By considering both sides of the argument regarding Iranian rationality and by recognizing the emergence of a new balance of power in the international community, one can objectively assess the potential threat that Iranian nuclear weapons might pose to the United States, in the event Iran successfully develops and fields such weapons.

One might question the rationality of any theocratic regime, especially one known for its support of international terrorism and labeled a member of the "Axis of Evil." Although this article cannot address any debate that this issue might instigate, it is interesting to note that domestic and foreign policy often trumps Iran's religious ideology. Certainly, Iran—like many other Islamic republics—has a worldview that differs from that of the West. Leaders draw on worldviews in assessing rationality and making decisions. In short, rationality becomes a relative matter because the costs and benefits of a given action depend upon one's worldview. Since Iranians' worldviews differ from Western ones, their actions may not appear rational to us; analyzed from an Iranian perspective, however, they become clearer.[18]

Despite its ideological commitment to Shiite Islam and Islamic revolutionary rhetoric, Iran is also a rational actor that will examine policy in terms of a cost/benefit analysis. Provocative statements from Iran serve to inflame the Arab street and weaken Sunni regimes hostile to Iran, while rallying the Muslim masses by presenting the country as defending Islam against Zionism and Western interference. According to Shlomo Ben-Ami, Israel's former foreign minister, "In my view this [rallying the Arab street] remains, even with this nuclear thing, the main purpose of Ahmadinejad's incendiary rhetoric. . . . If the discourse in the Middle East is an Arab discourse, Iran is isolated. If it is an Islamic discourse, then Iran is in a leading position. And always with the view of protecting Iran and the Iranian revolution, which is why they tried all the time to oppose the peace process."[19] This insight is critical to any attempt to predict the course of action Iran will pursue if it acquires nuclear weapons—or to any development of deterrence strategies for dealing with Iran.

Fariborz Mokhtari offers additional insight into Iranian national security motivations:

> Without allies or surrounding protective oceans, Iran's security must therefore be based on deterrence. . . . Iran's deterrence must of necessity be self-generated and self-reliant. A conventional force based on domestic resources, technology and industrial capacity, could not overcome the above security challenges. A credible nuclear deterrence with a reliable missile technology could, and is relatively inexpensive and probably within reach.[20]

The area surrounding Iran is inherently unstable. Given the troubled states of Iraq, Afghanistan, and Pakistan; the ongoing Israeli-Palestinian conflict; and challenges to the unipolar status of the United States; Iran occupies a unique position for obtaining a greater place not only on the regional stage but also on the world stage. More than likely, Iranians' foreign policy decisions will follow a course of action designed to increase national influence and status rather than undermine stability and increase the division between themselves and the regional and international community. Indeed, Henry Kissinger reminds us that

"nations have pursued self-interest more frequently than high-minded principle."[21] Iran is a theocratic state with a deeply ingrained Shiite perspective, but it is also a modern nation-state that must calculate its actions carefully or fade into oblivion. Therefore, such issues as national pride and prestige, pursuit of great-power status, negation of perceived threats to national security, and domestic political agendas of social elites probably motivate it more than religious zeal or mischievous intentions.[22]

Even many Israelis acknowledge the rationality of Iranian foreign policy decisions despite the rhetoric often portrayed to international audiences—an interesting perspective, considering Ahmadinejad's radical comments regarding the Holocaust and Israel's right to exist. Israeli television journalist Ehud Yaari notes that "people [in Israel] respect the Iranians and the Iranian regime. They take them as very serious, calculating players."[23] Additionally, Ephraim Halevi, former director of the Mossad and head of the Israeli National Security Council, asserts, "I don't think they are irrational, I think they are very rational. . . . To label them as irrational is escaping from reality and it gives you kind of an escape clause."[24] Trita Parsi, president of the National Iranian American Council, captures the underlying concern in the Israeli-Iranian rivalry: "Israel and Iran's fear that the creation of a new order in the region would benefit the other is acute precisely because the Middle East lacks a geopolitical basis for its frail order."[25] Parsi even goes so far as to cite "several Israeli decision-makers" who state that "the [Israeli] Labor Party exaggerated the Iranian threat for political reasons."[26]

R. K. Ramazani points out that "the tension between religious ideology and pragmatism has persisted throughout Iranian history . . . [yet] the dynamic processes of cultural maturation seem to be shifting the balance of influence increasingly away from religious ideology toward pragmatic calculation of the national interest in the making and implementation of foreign policy decisions."[27] Iran's purchase of arms from the United States and Israel illustrates its rationality in foreign affairs. The transaction, which occurred during the Iran-Iraq War of 1980–88, took place via intermediaries in order to bolster Iranian forces while providing assistance to the United States and Israel in securing the release of hostages in Lebanon.[28] This scenario is similar to the United States' covert program to provide other military equipment to Iran in exchange for the release of American hostages seized following the Iranian Revolution—commonly known as the Iran-Contra Affair. If religious ideology lies at the heart of Iranian foreign policy, one wonders why Iranian leaders would make agreements with the "Great Satan." According to Ramazani, "When Iran's ideological and strategic interests collided, as they did in the 1980s, strategic considerations consistently prevailed."[29] Moreover, Iranian president Seyed Mohammad Khatami's first major political address, directed not toward Iranians but Americans, reflects calculation beyond theology in its attempt to build a bridge between the United States and Iran by highlighting similarities between the American and Iranian revolutions.[30] Khatami's administration worked to overcome impressions of Iranian radical fundamentalism in foreign policy, even going so far as to condemn the terrorist attacks of 11 September 2001 and to help the United States topple the Taliban in Afghanistan:

> The Afghan Islamists evinced visceral hatred for Shiites, fuelling Iranian fear and anger. Ousting them from power, increasing Iranian influence on its neighbour and returning the many Afghan refugees living in Khorasan province were the Islamic Republic's barely concealed wishes. As a result, Iran cooperated with U.S. military forces, providing substantial assistance to Operation Enduring Freedom.[31]

Unfortunately, these overtures—clear examples of rational state behavior—were forgotten as Pres. George W. Bush proclaimed Iran a member of the Axis of Evil. Interestingly, the Bush administration received a proposal from Iran (by way of Swiss intermediaries) to open a dialogue

regarding its nuclear program and reach a consensus (an offer that the United States flatly rejected):[32]

> From Iran's perspective, it was the ultimate reversal and betrayal. Tehran had worked with America to get rid of a dangerous adversary. Then, without warning, Washington turned around, branded it a member of [what President Bush called] "the axis of evil." In the meantime, the U.S. closed ranks with a country, Pakistan, that did precisely what Washington accused Iran of wishing to do: acquire a nuclear bomb, harbour terrorists and provide support to militants in a neighboring country, Afghanistan.[33]

If Iran is in fact a rational actor, then we can understand and deal with its reasons for possibly wanting nuclear weapons. From Iran's perspective, nuclear weapons may offer protection from regional and global forces that exert pressure to constrain its actions. Such pressures likely include Iran's perceived encirclement by the United States, the Israeli nuclear weapons program, the Pakistani nuclear weapons program, domestic political motivations, and the growing notion that to be a great power, a state must possess nuclear weapons.[34] Because Iran has lived under sanctions and threat of attack since the theocratic regime came to power in 1979, we might acknowledge that its leaders are acting logically when they seek a means of increasing their state's security and international standing through nuclear technology. Ultimately, we can explain Iranian efforts to develop a nuclear weapon in terms of countering real or perceived threats to the state, increasing state prominence in the international community, and attaining hegemonic power in the Middle East—rational actions to which we can apply theoretical models to assess their potential threat to the United States. This is not to deny that a nuclear-armed Iran will have other consequences: a regional arms race, a need for so-called nuclear umbrellas, and the actions of nonstate actors sponsored by Iran, to mention a few.[35] Concerns remain about America's ability to influence the region if Iran goes nuclear, however. A first strike against the United States or its allies or a Middle East arms race certainly gives cause for concern, yet the same risks existed during the Cold War. America's strategic readiness and commitment to the defense of its allies proved sufficient to manage the Soviet threat. The same is true today in the case of Iran: just as we kept the Soviet Union in check with a healthy, robust, and credible US nuclear deterrent, so can we contain Iran by employing similar nuclear policies.

Conclusion

The United States established nuclear policies between 1945 and 1968 to counter a growing communist threat led by the Soviet Union. Policy makers took rational action based on technical developments, national interests, and the dynamics of the international security situation of the time. This point is important because by recognizing the underlying motivations of a given country's agenda for nuclear proliferation, one can better craft an approach that produces stability by rationally addressing the level of threat posed by the potential adversary. As demonstrated above, Iran has logical and rational motivations for acquiring nuclear technology; therefore, we can likely exert control by using deterrent philosophies similar to those we employed against the Soviet Union throughout the Cold War. However, we must temper these deterrent policies with an objective understanding of Iran's underlying motivations in order to avoid overestimating the threat or arousing unnecessary international antagonism. In short, as long as rising powers pursue nuclear technology that can facilitate weapons production, the United States should maintain a healthy, robust, and credible nuclear deterrent, complete with first- and second-strike capabilities. Such a strategy enables the United States to maintain its security and position, regardless of the actions of other states. ✪

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Notes

1. Stephen M. Younger, *The Bomb: A New History* (New York: Ecco Press, 2009), 19.

2. Samuel R. Williamson Jr. and Steven L. Rearden, *The Origins of U.S. Nuclear Strategy, 1945–1953* (New York: St. Martin's Press, 1993), 29.

3. Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd ed. (New York: Palgrave MacMillan, 2003), 29.

4. For a more detailed discussion of the New Look strategy, see ibid., 84.

5. National Security Council Report 68, "United States Objectives and Programs for National Security," 14 April 1950, accessed 20 May 2010, http://www.fas.org/irp/offdocs/nsc-hst/nsc-68.htm.

6. Developed in the 1950s, the concept was known as a "stable balance of terror." Freedman, *Evolution of Nuclear Strategy*, 234.

7. Ibid., 51.

8. Ibid., 172.

9. Graham Allison and Philip Zelikow, *Essence of Decision: Explaining the Cuban Missile Crisis*, 2nd ed. (New York: Longman, 1999), 27–28.

10. Freedman, *Evolution of Nuclear Strategy*, 61–64.

11. Stephen I. Schwartz, ed., *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons since 1940* (Washington, DC: Brookings Institution Press, 1998), 227.

12. Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: A Debate Renewed*, 2nd ed. (New York: W. W. Norton & Company, 2003), 6–8.

13. Mustafa Kibaroglu, "Good for the Shah, Banned for the Mullahs: The West and Iran's Quest for Nuclear Power," *Middle East Journal* 60, no. 2 (Spring 2006): 223.

14. David Williams, "A Review of U.S. First-Strike Ambiguity and the Triad Nuclear Force," *Defense Threat Reduction University Journal*, forthcoming.

15. Younger, *Bomb: A New History*, 205.

16. Graham Allison, "Nuclear Deterrence in the Age of Nuclear Terrorism," *Technology Review* 111, no. 6 (November/December 2008): 72.

17. Nazila Fathi, "Iran's President Says Israel Must Be 'Wiped Off the Map,'" *New York Times.com*, 26 October 2005, accessed 23 June 2010, http://www.nytimes.com/2005/10/26/international/middleeast/26cnd-iran.html; and Brian A. Jackson et al., *Aptitude for Destruction*, vol. 2, *Case Studies of Organizational Learning in Five Terrorist Groups* (Santa Monica, CA: RAND, 2005), 38–39, accessed 12 July 2010, http://www.rand.org/pubs/monographs/2005/RAND_MG332.pdf.

18. Kristen Renwick Monroe and Lina Haddad Kreidie, "The Perspective of Islamic Fundamentalists and the Limits of Rational Choice Theory," *Political Psychology* 18, no. 1 (March 1997): 19–43.

19. Trita Parsi, *Treacherous Alliance: The Secret Dealings of Israel, Iran, and the United States* (New Haven, CT: Yale University Press, 2007), 265.

20. Fariborz Mokhtari, "No One Will Scratch My Back: Iranian Security Perceptions in Historical Context," *Middle East Journal* 59, no. 2 (Spring 2005): 211.

21. Henry Kissinger, *Diplomacy* (New York: Simon & Schuster, 1994), 19.

22. Kibaroglu, "Good for the Shah," 223.

23. Parsi, *Treacherous Alliance*, 270.

24. Ibid.

25. Ibid., 262.

26. Ibid., 266.

27. R. K. Ramazani, "Ideology and Pragmatism in Iran's Foreign Policy," *Middle East Journal* 58, no. 4 (Autumn 2004): 549.

28. Ibid., 556.

29. Parsi, *Treacherous Alliance*, 263.

30. Ramazani, "Ideology and Pragmatism," 557.

31. International Crisis Group, "U.S.-Iranian Engagement: The View from Tehran," Middle East Briefing, no. 28, 2 June 2009, 3, accessed 12 July 2010, http://www.ciaonet.org/pbei/icg/0016731/f_0016731_14434.pdf.

32. Steven E. Miller, "Proliferation Gamesmanship: Iran and the Politics of Nuclear Confrontation," *Syracuse Law Review* 57, no. 3 (2007): 591.

33. International Crisis Group, *U.S.-Iranian Engagement*, 4.

34. Abbas Kadhim, "The Future of Nuclear Weapons in the Middle East," *Nonproliferation Review* 13, no. 3 (November 2006): 584–86.

35. Scott Sagan notes that *nuclear umbrella* is a misnomer. *Umbrella* implies coverage, as provided by an antiballistic missile system, for example. Actually, it refers to a promise of retaliation from a third party. Scott D. Sagan, "The Case for No First Use," *Survival* 51, no. 3 (June–July 2009): 168, accessed 12 July 2010, http://iis-db.stanford.edu/pubs/22534/51-3_12_Sagan_author_proof.pdf.

Integration of Special Operations Forces and Airpower in Irregular Warfare

Examining the "FACs"

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The rapid, decisive campaign conducted against the Taliban by US special operations forces (SOF) in conjunction with the Northern Alliance and supported by US airpower in the opening phases of Operation Enduring Freedom captured the attention of military professionals throughout the world—allies and potential adversaries alike. Enthusiastic proponents heralded the campaign as a template for future military transformation, and even the less sanguine observers were forced to acknowledge an impressive synergy and economy of force in the SOF-airpower combination. The manifest operational benefits of modern airpower's key characteristics of precision, persistence, and reach have combined with SOF's unique attributes to impart a strategically significant synergistic effect. Particularly in the context of its unique relationship with SOF, airpower constitutes perhaps the single most effective asymmetric US advantage in the operational environment of irregular warfare (IW). Despite revolutionary advances in modern airpower, however, at least one area has progressed less consistently, arguably even losing ground from its historical zenith: the doctrinal and organizational aspects of air-ground integration in support of special operations. Yet, ironically, this critical nexus of airpower and SOF, despite some degree of recent neglect, potentially offers perhaps the most return on investment in terms of operational effectiveness.

Through the Past, Darkly: Integration of Special Operations Forces and Airpower in Military Assistance Command, Vietnam—Studies and Observations Group, 1964–72

As has often occurred throughout history—and perhaps military history in particular—a discriminating examination of the past may uncover keys that unlock future potential, though teasing out relevant lessons can become a deceptively daunting task, particularly if their historical context is conveniently forgotten. One such historical rose has bloomed in the thorny history of US counterinsurgency efforts in Southeast Asia: the highly successful integration of airpower in the operations of Military Assistance Command, Vietnam—Studies and Observations Group (MACV-SOG) during its secret eight-year war in Laos and Cambodia.

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In the wake of the aborted Bay of Pigs invasion of Cuba, Pres. John F. Kennedy appointed Gen Maxwell Taylor to lead a commission charged with analyzing the fiasco and making recommendations about avoiding a recurrence. Among other conclusions, the commission determined that Director William Colby's Central Intelligence Agency was increasingly engaged in operations beyond those of a purely intelligence nature.[1] Ultimately, it recommended assigning operational missions, including several ongoing operations in Southeast Asia, to the US military.[2] As a result, Secretary of Defense Robert McNamara directed MACV to establish a covert unit under the auspices of Operation Plan 34A to assume responsibility for certain ongoing Central Intelligence Agency programs in Southeast Asia, effective 1 February 1964.[3] Originally dubbed the "Special Operations Group," the name of the unit later changed to "Studies and Observations Group" in token deference to operational security. The unit included members of the US Army Special Forces, US Navy SEALs, and US Air Force Air Commandos operating loosely under the operational security umbrella of the 5th Special Forces Group in Vietnam. MACV-SOG's charter called for conducting strategic reconnaissance, sabotage, interdiction, and personnel recovery operations in Cambodia, Laos, and North Vietnam.[4]

On 2 November 1965, SOG's Reconnaissance Team Alaska entered Laos as part of Operation Shining Brass (code name for SOG operations in Laos, later changed to Prairie Fire).[5] US forces extracted the team after it made contact with a superior enemy force on the fourth day "in country," but the team's "One Zero" (team leader) later returned to the area in the right seat of an Air Force forward air controller's (FAC) O-1 "Bird Dog" aircraft in order to locate airstrike targets identified during Reconnaissance Team Alaska's mission.[6] SOG immediately recognized the utility of teaming a senior SOG operator with an Air Force FAC. Subsequently, SOG entered a formal agreement with Seventh Air Force, as described by former SOG operator Maj John Plaster:

> Each day a 20th Tactical Air Support Squadron FAC, with a USAF code name Covey, would fly over southern Laos to assist SOG; in return, SOG would detail an experienced recon man to ride with the FAC, to help look for targets, select LZs [landing zones], plan insertions and extracts, and stay in radio contact with the recon teams. Called "Covey Riders," *these SOG old hands saved many lives because they understood exactly what those on the ground were going through, resulting not just in an economy of language or effective use of air support, but an unanticipated psychological dimension that was hard to explain*.[7] (emphasis added)

On the other side of the cockpit, Maj Reginald Hathorn served as an Air Force FAC with the 23rd Tactical Air Support Squadron, operating from Nakhon Phanom Royal Thai Air Base in support of SOG's Prairie Fire and Heavy Hook (code name for SOG operations in North Vietnam) missions in 1968 and 1969.[8] Hathorn tells a similar tale regarding both the success of the special operator–FAC teaming concept and the Air Force's reciprocation of the commitment by assigning only the most skilled and experienced pilots to fly SOG support missions: "The 23rd's pilots who flew . . . for the 5th Special Forces under MACVSOG, were the most experienced pilots the 23rd had . . . as possibilities of engagement with NVA [North Vietnamese Army] forces was [*sic*] certain to be 100% over time. . . . Therefore, it was imperative that the 23rd FAC be a mature, highly experienced pilot and Forward Air Controller."[9] Clearly, special operators and their supporting FACs had reached a consensus regarding the operational value of the "covey rider" arrangement. Encapsulating the strategic impact of SOG operations in Southeast Asia, Plaster labels them "the most successful economy of force in US history," estimating that "at one point each American Green Beret operating in Laos was tying down six hundred NVA defenders, or about one NVA battalion per SOG recon man in

the field." Despite high losses, the SOG kill ratio rose as high as 150:1, as documented by MACV in 1969.[10]

Similarly, in his insightful study of the integration of close air support (CAS) among conventional forces, Maj Michael D. Millen, USAF, turns his attention to Southeast Asia, extensively surveying FAC (airborne) (FAC[A]) operations in the Vietnam War. He examines the role of the FAC(A) in the successful conduct of CAS, noting that "most importantly with regard to this research, the Air Force's methods of detailed integration in planning and Air Force and Army interaction were significantly different at the tactical level than they have been since." He further asserts that "in Southeast Asia, unlike conflicts since, the FAC(A) was assigned to a flying squadron, a Tactical Air Support Squadron, but attached to an Army maneuver unit as part of the TACP [tactical air control party]. *In this era, the FAC(A) truly was an extension of the ground commander, and since he planned alongside, and lived with, the supported unit, his planning was quite detailed and wholly integrated*" (emphasis added).[11] Millen's observations further lament the current failure to apply this integrated FAC(A) concept.

Forward to the Present: Integration of the Forward Air Controller (Airborne) and Special Operations Forces

At present, each service that possesses tactical fixed-wing aircraft maintains a nominal FAC(A) capability.[12] The Air Force's capability resides primarily with the very able, purpose-built OA-10 but also extends to selected F-16 crews. The Navy retains a handful of FAC(A)-qualified aircrews in each of its two-seat F/A-18F squadrons, while the Marine Corps maintains FAC(A) capability in the AV-8B, UH-1N/Y, AH-1W/Z, and F/A-18A/C/D, considering FAC(A) a primary mission for its F/A-18D squadrons.[13] All aircrews flying FAC(A) missions designated by an air tasking order must be current and qualified in accordance with their respective service requirements, though the latter differ slightly. FAC(A)s from the various services have flown missions in support of SOF engaged in Operations Iraqi Freedom and Enduring Freedom, including a secretive joint Air Force and Navy task force based on shore that included Navy F-14 FAC(A)s in direct support of SOF Task Force 20 operators who conducted counter-high-value individual missions in Iraqi Freedom during March and April of 2003.[14] Although this arrangement evidently experienced success from an operational standpoint, Navy leadership appears to have resisted the precedent of basing the service's tactical aircraft ashore.[15] In any case, it has not recurred to date, nor has a service established any other habitual training or enduring operational support relationship between a FAC(A) and SOF unit. Nevertheless, individual SOF combat controllers and fire support officers have attempted, with varying success, to initiate relationships in-theater using liaison officers and unit standard operating procedures on a sporadic, ad hoc basis. Additionally, unofficial associations have developed between both the Air Force Weapons School and Navy Strike Fighter Weapons Schools and selected SOF units for the purpose of coordinating the development of tactics, techniques, and procedures.

Role of the Forward Air Controller (Airborne): Past and Present

Millen's survey of Southeast Asian FAC(A) operations reveals broad consensus among his sources regarding the role of the FAC(A): "All made it clear that the FAC(A), and more specifically the slow FAC, . . . was the linchpin of CAS in South Vietnam. They attribute the FAC's success primarily to his ability to maintain an integral knowledge of the ground commander's plan and force ar-

ray, and to translate that knowledge and understanding into fire support in the form of CAS."[16]

According to the 2003 version of the joint doctrine manual for CAS, "the FAC(A) is normally an airborne extension of the TACP" and thus ultimately of the supported commander on the ground.[17] The 2009 version of that manual retained this longstanding definition of the FAC(A) role but augmented it with a more detailed enumeration of the roles and missions of the FAC(A), including radio relay, reconnaissance, control of indirect fires, asset coordination and deconfliction, battle damage assessment, target marking and designation, generation of coordinates, suppression of enemy air defenses, and terminal attack control.[18] That version culminates with the key observation that "the FAC(A) must be capable of executing the desires of the ground commander in day, night, and adverse weather conditions; integrating fires on the battlefield; mitigating fratricide; and conducting detailed planning and integration with the maneuver element."[19]

Key Characteristics of Forward Air Controllers (Airborne)

Several attributes of FAC(A)s advantageously position them to fulfill this difficult but critical role. First and most obviously, they have an airborne perspective. FAC(A)s view the battlefield from the same vantage as the CAS aircraft they control: a decidedly macrolevel, two-dimensional, "bird's-eye" view (in contrast to the three-dimensional view of the ground joint terminal attack controller [JTAC], which is dominated by a limited horizon, vertical development, and microterrain). Moreover, FAC(A)s, usually experienced providers of CAS themselves, possess a deep knowledge of aircraft, sensor, and weapon system capabilities and limitations, as well as unmatched familiarity with ordnance-delivery profiles, weaponeering limitations, and the effects of air-delivered weapons. Second, FAC(A)s typically have more training and experience in the realm of the supported ground commander than typical aviators who perform CAS. Often, the best of the FAC(A)s have served as JTACs on the ground. The only service that institutionalizes this practice, the Marine Corps, includes FAC tours as mandatory elements of its aviator career path, although the other services can cite selected examples of such personnel. Interestingly, Navy FAC(A)s, whose program parallels that of the Marine weapons school—Marine Aviation Weapons and Tactics Squadron One—are the only current service FAC(A)s to date who must universally qualify as ground JTACs prior to commencement of the airborne portion of the FAC(A) syllabus. This requirement imbues them with at least some nominal appreciation for the JTAC's and ground commander's perspective. Derived from their unique position and experience, the ability of FAC(A)s to bridge the perspective/knowledge chasm between air and ground assures their enduring value.

Integration and Beyond

Major Millen's superb study includes interviews with numerous FAC(A)s who had recent combat experience in Iraqi Freedom regarding their roles and responsibilities in facilitating the effective integration of CAS. His findings uncover a universal consensus that "FAC(A) requirements for detailed integration, both in planning and execution, are significantly different than for a simple CAS sortie."[20] Similarly, Millen identifies the tactical payoff for this increased requirement of the FAC(A): "As a general rule, the more detailed the FAC(A)'s knowledge, the less information he will have to pass to the CAS aircraft for them to employ effectively. This enables him to utilize more aircraft in a given time period, thereby striking more targets and increasing CAS efficiency and effectiveness."[21]

Millen's research then turns to investigating how the FAC(A) acquires such detailed knowledge. His subsequent analysis

of current joint organization and doctrine shows that existing allocation and tasking processes (air tasking order) and command and control architectures do not support attainment of the required level of FAC(A) knowledge for routine, detailed integration of these controllers into the supported ground commander's scheme of fire and maneuver, despite doctrinal acknowledgement of its necessity for the effective employment of FAC(A)s.[22]

One key point concerns sortie allocation.[23] Millen's study highlights a degree of continuity in FAC(A) tasking as a critical necessity for attainment of the requisite level of situational awareness. The majority of the study's respondents indicate a desire for repeated assignments to support the same maneuver units, or at least service the same area of operation on successive missions, in order to acquire the degree of familiarity and situational awareness they believe necessary for optimal effectiveness.[24] Coupled with adequate aircraft endurance, this continuity of allocation allows the FAC(A) to develop the high degree of situational awareness necessary to effectively control the delivery of ordnance in close proximity to friendly troops and civilians. Both Hathorn and Plaster recount numerous examples of FAC(A)s controlling fires within 100 meters of friendly forces in Southeast Asia (well within the "danger close" distances for the ordnance involved) with impressive regularity.[25] Given that they controlled unguided weapons exclusively, delivered from aircraft with a best-case 10-mil delivery accuracy, this feat represents an astounding degree of professionalism and nerve.[26] Despite revolutionary improvements in precision derived from technological advancements in modern aircraft and weapons, delivering ordnance at the desired place and time (i.e., on target) remains highly dependent upon the situational awareness of the fallible human who performs terminal control. As previously noted, in the case of the FAC(A), current doctrinal organization, allocation processes, and command and control architecture do not accommodate the degree of continuity in FAC(A) allocation necessary to ensure this level of situational awareness consistently.

If current doctrine and organization contain serious shortfalls in accommodating the doctrinally specified level of "detailed . . . integration" of the FAC(A) into the ground scheme of fire and maneuver, the cohesive human element of air-ground integration remains completely unacknowledged. Long ago, the US Army recognized the deleterious effect of its individual personnel-rotation policy upon unit cohesion and effectiveness. Nor are individual infantry platoons (let alone SOF units) routinely expected to play tactical "pickup games" in mission assignments with lives at stake. Yet, an analogous situation has, in fact, transpired with respect to doctrinal organization and allocation of FAC(A)s since the conclusion of the Vietnam War. In the case of SOF, which has already demonstrated that establishment of an organic, direct-support aviation arm with enduring training and operational relationships is both practical and inherently valuable, such a conspicuous oversight becomes all the more inexplicable.[27]

Beyond doctrinal roles and missions, the true value of FAC(A)s resides in their ability to bridge the operational domains of air and ground. More often than not, the crux of that bridge is a very human bond between aviators and Soldiers or special operators. The bridge must begin with a mutually firm, elemental grasp of the nature, objectives, capabilities, and limitations inherent in both environments. This part of the bridge is built through both parties' technical mastery of the tools of the trade and comprehensive knowledge of the tactics, techniques, and procedures comprising the tactical doctrine of both air and ground. Such a common understanding enables what is drily referred to in doctrine as *integration*. But to achieve its full potential, the bridge must ultimately rest upon a founda-

tion of that distinctly human element gained only through the continuity of relationships based on shared life-and-death challenges known as *trust*. Perhaps that is, in fact, the "unanticipated psychological dimension" which Major Plaster finds difficult to explain.

Opportunity Knocks

The Air Force has received initial funding to support the fielding of 15 light attack armed reconnaissance (LAAR) aircraft in fiscal year 2011, 12 of which will be combat coded.[28] Specifications of the aircraft's armament include up to two 7.62 mm minigun pods, two 500-pound-class precision munitions, two 2.75-inch rocket pods, and the AGM-114 Hellfire missile, complemented by the LAAR's advanced avionics, communications, sensors, data links, and full-motion-video capability.[29] The aircraft must operate from austere forward locations and provide a nominal five-hour endurance with a range of 900 nautical miles, a ceiling of 30,000 feet, and an estimated operating cost of only $1,000 per flight hour.[30] Funded under the Air Force's OA-X program, the aircraft will conduct missions envisioned to include FAC(A). LAARs are scheduled to attain initial operational capability with a 24-aircraft squadron assigned to Air Combat Command as soon as 2013. Despite ongoing source selection, candidates currently include the Embraer EMB-314 Super Tucano (now successfully employed by the Colombian Air Force in the counterinsurgency role) and the Hawker Beechcraft AT-6.[31]

Longtime proponents of reviving a dedicated "slow FAC" platform from the storied lineage of the O-1, O-2, and OV-10, employed so successfully in Southeast Asia for counterinsurgency applications, no doubt are excited by the prospect of a modern version equipped with the latest avionics, sensors, and precision-guided munitions for possible counterinsurgency employment in Afghanistan and beyond. The LAAR program appears to signal a programmatic and cultural shift toward recognizing the value of a purpose-built light attack platform to the IW fight; however, there remains the greater question about whether the services will properly integrate this platform so that it provides optimal support to the customer.

Recommendations

The Air Force and US Special Operations Command should seize the opportunity presented by fielding a purpose-built light attack aircraft tailored to IW; doing so will allow them to implement a parallel doctrinal reorganization that re-creates the successful relationship between SOF and Air Force FAC(A)s assigned to tactical air support squadrons in Southeast Asia. Lt Col Michael Pietrucha, USAF, envisions just such a successful outcome in which future hypothetical light attack detachments "gave aircrews direct exposure to the units they supported, raised the confidence level of participants, and facilitated the detailed integration and planning necessary for a successful air-ground team."[32]

The LAAR program represents a promising technological and programmatic step toward more effective SOF-air integration, but the organizational aspects of this integration are at least as critical to the operational performance and strategic impact of the SOF-air team. Accordingly, the Air Force and Special Operations Command should do the following:

- When a LAAR squadron attains initial operational capability, assign it to Air Force Special Operations Command to be attached under tactical control of a joint special operations task force operating in Afghanistan as soon as practicable in order to develop an effective concept of operations for optimal SOF-air integration. This would likely include a scheme of distributed "hub and spoke" operations that would capitalize on the LAAR's expeditionary field capability, facilitate integrated planning

with supported units, and improve on-station and response times.

- Assign only the most experienced volunteer FAC(A) aircrews to SOF support squadrons, thereby building both an experienced cadre and organizational trust.
- Initiate selective "closed loop" personnel assignment of designated SOF-support FAC(A) aircrews as SOF fire support officers during nonflying joint assignments as a means of enhancing FAC(A) understanding of and familiarity with SOF tactics, techniques, and procedures and requirements.

As for the Air Force Weapons School, it should reexamine the utility of FAC(A) sector operations as a way of leveraging the distributed operations capability of the LAAR to increase FAC(A) continuity and situational awareness in support of conventional general-purpose forces, with whom a unit-embedded FAC(A) organizational scheme might prove impractical.

Conclusion

The complementary capabilities and characteristics of SOF and modern airpower represent a symbiotic relationship that affords a degree of synergy to IW, which, if properly leveraged, will contribute significantly to maximizing the strategic effectiveness of the US military's counterinsurgency operations in Afghanistan. Modern revolutions in the precision, persistence, and reach of airpower have further assured the innate effectiveness of the SOF-airpower team, but progress in one critical area of SOF-air integration has lagged technological advances: FAC(A) integration.

Historically, in both doctrine and practice, the FAC(A) has served as a critical nexus in the effective assimilation of SOF and airpower. Lacking until recently the prospect of a slow FAC platform tailored to IW operations, as well as the doctrinal command and control architecture and organizational relationships to facilitate the level of detailed integration into the ground scheme of fire and maneuver required for optimal effectiveness, SOF-air integration has fallen short of its full potential. The Air Force's LAAR program presents a unique opportunity to realize that potential, but only by properly implementing the organizational and relational aspects of its integration. In CAS—as in all human endeavors, from basic troop leading to statecraft—relationships matter. ✪

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Notes

1. William Colby himself was a storied veteran of the Office of Strategic Services' Jedburgh covert operation, which organized resistance behind German lines in World War II.
2. John L. Plaster, *SOG: The Secret Wars of America's Commandos in Vietnam* (New York: Penguin Books, 1998), 22–23.
3. Ibid., 23.
4. Ibid., 23–24.
5. Ibid., 40.
6. Ibid., 41.
7. Ibid.
8. Reginald Hathorn, *Here There Are Tigers: The Secret Air War in Laos, 1968–69* (Mechanicsburg, PA: Stackpole Books, 2008), xii–xiii.
9. Ibid., 221.
10. Plaster, *SOG*, 355.
11. Michael D. Millen, "Improving Detailed Integration in Close Air Support Planning and Execution" (thesis, US Army Command and General Staff College, 2004), 16, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA428778&Location=U2&doc=GetTRDoc.pdf.
12. The term "forward air controller" (FAC) has become "forward air controller (airborne)" (FAC[A]) to distinguish it from the US Marine Corps' term for a naval aviator serving as a joint terminal attack controller on the ground.
13. Joint Publication (JP) 3-09.3, *Close Air Support*, 8 July 2009, I-3, http://www.dtic.mil/doctrine/new_pubs/jp3_09_3.pdf.

14. Tony Holmes, *US Navy F-14 Tomcat Units of Operation Iraqi Freedom* (Oxford, UK: Osprey Publishing, 2005), 69–75.

15. Ibid., 69.

16. Millen, "Improving Detailed Integration," 17.

17. JP 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)*, 3 September 2003, II-14, accessed 24 August 2010, http://www.bits.de/NRANEU/others/jp-doctrine/jp3_09_3(95).pdf.

18. JP 3-09.3, *Close Air Support*, 8 July 2009, I-3.

19. Ibid., III-38.

20. Millen, "Improving Detailed Integration," 30.

21. Ibid.

22. Ibid., 30–60.

23. Ibid., 51.

24. Ibid.

25. Hathorn, *Here There Are Tigers*, 222; and John L. Plaster, *Secret Commandos: Behind Enemy Lines with the Elite Warriors of SOG* (New York: Penguin Books, 2005), 280.

26. One mil equals one meter of weapon dispersion per 1,000 meters of slant range to the target.

27. Both the Air Force's 1st Special Operations Wing and the Army's 160th Special Operations Aviation Regiment exemplify this type of direct-support aviation arm with established organizational and habitual training relationships.

28. Marcus Weisgerber, "The Light Attack Aircraft," *Air Force Magazine* 93, no. 1 (January 2010): 58, http://www.airforce-magazine.com/MagazineArchive/Documents/2010/January%202010/0110aircraft.pdf.

29. "USAF Receives First Funding for LAAR Aircraft Programme," *airforce-technology.com*, 11 December 2009, accessed 4 August 2010, http:/www.airforce-technology.com/news/news72193.html.

30. Ibid.

31. Ibid.; and Eric Palmer, "Funding for USAF's Light Attack Armed Reconnaissance Aircraft," ELP Defens(c)e Blog, 9 December 2009, accessed 4 August 2010, http:/ericpalmer.wordpress.com/2009/12/09/funding-for-usafs-light-attack-armed-reconnaissance-aircraft/.

32. Lt Col Michael W. Pietrucha, "Seeing the Whole Elephant: Envisioning a Successful Light Attack Program for the US Air Force," *Air and Space Power Journal* 24, no. 3 (Fall 2010): 48.

Global Power Requires a Global, Persistent Air-to-Air Capability

Lt Col Bruce D. Cox, USAF

During the last decade, the US Air Force saw its status begin to wane significantly with respect to the other US armed forces, in part due to a change in the focus of American foreign policy, high costs of the wars in Iraq and Afghanistan, and the rise of powers such as China and India. However, fixation on certain narrow areas of military power and airpower over the years has made the Air Force, much more than the other services, unable to adapt easily to changing circumstances that affect its standing. Specifically, our service has failed to maintain its ability to conduct general military operations by having lost sight of the essence of airpower—gaining and maintaining air superiority. More to the point, it has never emphasized the projection of air-to-air airpower at intercontinental ranges, let alone with any persistence at those distances.

Although this deficiency has negatively affected the status of the Air Force, more importantly, it has left the United States lacking in a key area. Almost all of the major conventional military scenarios with which the United States is concerned these days require air-to-air power on scene as quickly as possible (e.g., defense of the Taiwan Strait and the new North Atlantic

Treaty Organization member states along the Baltic, where we have only limited immediate capability). Currently we measure our deployment time of forces to most regions in weeks. If the Air Force had a true long-range air-to-air capability, the United States could exert its influence within hours. Potentially, the Air Force could approximate the capabilities of an Aegis ship or aircraft carrier in any region of the world within 24 hours and sustain operations for a week.[1] However, we do not seem to recognize the absence of such an option—a potential game changer—as a deficiency. But the need is obvious in many places worldwide.

Traditionally, when we think of air-to-air capability, we think of fighter aircraft. This article explores the specific "effect" of being able to shoot down an opposing aircraft at an intercontinental distance from a home airfield.[2] Although current fighter aircraft might produce this effect, the article examines alternative air-breathing remotely piloted and piloted airborne means of doing so.[3] Evidently the fastest way to attain minimum capability in this area with our current technology involves modifying a bomber, such as a B-1. In the longer term, other methods might be better, but only with a substantial expenditure of funds.[4]

The Geopolitical Need

We can probably gain air superiority more efficiently by attacking enemy aircraft at their bases or by targeting ground-based resources critical to their employment, but an abundance of historical material yields examples of times when such attacks proved impossible. Often, political reasons mandated that an air force gain and maintain air superiority without attacking the enemy's bases or vital logistical resources—as in the Korean War, for instance.[5] Additionally, various no-fly zones imposed during the 1990s had varying restrictions on what the Air Force could do against ground targets associated with opposing air forces. We have every reason to expect similar political impediments in the future. We can put an air-to-air capability into position only by moving ground-based aircraft to a base or positioning an aircraft carrier within range of the area of interest. Unfortunately, moving aircraft to forward bases is a ponderous process, measured at least in days. Positioning a carrier may actually prove faster, assuming the possibility of moving one close enough.

Flying a long-range air-to-air-capable aircraft into an area of interest to establish a no-fly zone while follow-on forces deploy could deter many potential conflicts and offer decisive advantages in other scenarios. In particular, this effect could be the ultimate solution to "antiaccess" strategies of opposing military powers.

The Problem

In the 1950s, the Air Force considered itself the premier branch of the US military because of its status as the only service that had a viable intercontinental nuclear strike capability. During this era, Strategic Air Command (SAC) eliminated long-range fighter escorts since it deemed such aircraft unnecessary for intercontinental nuclear strikes.[6] In the 1960s, with the advent of the submarine-launched ballistic missile and the Vietnam War, the Air Force's status declined accordingly. The Navy could claim that its nuclear delivery bested the Air Force's, and the Army declared that future wars would be conventional, not nuclear.

With the reemergence of conventional war as the focus, the bomber generals in the Air Force gave way to the fighter generals in the 1970s and 1980s.[7] Unfortunately, both groups fixated on their specialized areas at the expense of true long-range capability in conventional combat. The bomber generals emphasized nukes rather than conventional capability and overall flexibility, and the fighter generals concentrated on short-range, intratheater conventional war, based on support to the Army in Europe and Korea. This trend left the Air

Force with only two air missions still unique to that service—long-range bombing and long-range airlift. The current leadership of the Air Force still includes many fighter generals who may think they have long-range fighters as well—but they don't.

We in the Air Force view reality in the context of what we are used to, and we don't notice when our reality becomes anachronistic. Obviously, B-2, B-52, and B-1 bombers can strike targets at intercontinental ranges, and C-17s and C-5s can deliver cargo at those distances. Obviously as well (and by some standards anachronistic if anyone ever thought about it), Air Force fighters cannot conduct counterair operations at anywhere near the same intercontinental ranges at which bombers and transports operate—a clear contrast to the Navy's capability. Navy transport ships range the globe with military equipment, much like Air Force transport aircraft. Additionally, however, Navy warships can intercept any ship—civilian or military, unarmed or armed—anywhere on the high seas, and in most coastal waters as well, and sink them if necessary by using guns, missiles, or torpedoes. Current Air Force air superiority aircraft can only intercept and, if necessary, shoot down other aircraft within a relatively short distance from their ground bases, even with in-flight refueling. A rapid program to give the Air Force a long-range air-to-air capability would correct this deficiency, address current criticism from Congress and pundits, and help silence the chorus of voices questioning the Air Force's existence as a separate service.[8]

The Theoretical Context

Almost all airpower theorists agree upon the necessity of establishing air superiority, the most fundamental principle of airpower, when conducting air campaigns or most other forms of war in the modern age.[9] Historical examples from World War II and subsequent conflicts seem to support this theory. Most theorists also agree that the easiest, most effective way to gain air superiority does not involve the destruction of individual enemy aircraft in air-to-air combat; rather, it calls for attacking them on the ground at their airfields or neutralizing them by eliminating something critical to their employment, such as fuel supplies or factories that produce them.[10] Even so, experience shows that despite strikes against enemy aircraft at their airfields or against related production facilities, air forces usually have to destroy opposing aircraft in air-to-air combat.[11] In fact, one cannot say with certainty that any air force has ever achieved air superiority solely by bombing ground targets.[12]

Given the historical record, the American military's serious deficiency in projecting air-to-air combat at any significant range from US borders or bases is surprising. This weakness, which seriously hampers America's ability to react to various crises, has largely escaped theoretical discussions of airpower strategy over the years. Most discussions address the types of ground targets to hit rather than how to establish air superiority at global ranges.[13] The Air Force should correct this problem because a true long-range air-to-air capability would significantly enhance the military options available to our national leadership and because we could realize at least a rudimentary capability at relatively low cost.

The Historical Record

One of the classic stories in the history of the Air Force, that of the P-51 Mustang in World War II, deals specifically with long-range air-to-air capability, yet today's Air Force strangely ignores the lessons of that experience. Every aviation history enthusiast knows that the United States began the war believing in high-altitude daylight bombing as the proper way to project airpower. When we put this prewar assumption into practice in the skies over Germany, however, we soon began to question its validity.[14] Losses sustained by the bomb-

ers were so great that the Army Air Forces quickly curtailed bombing raids at ranges that prevented fighter escort.[15] Introduction of the P-51 Mustang as the critical long-range escort fighter enabled US forces to resume bombing raids deep into German airspace and quickly sweep European skies of German aircraft.[16] Less well understood is that the P-51's victory over the Luftwaffe proceeded not simply from escorting bombers but from using it offensively to seek out and destroy enemy fighters in flight, at their airfields, and anywhere else.[17]

After the war, the newly created SAC took over the long-range bomber mission.[18] Much like the mixed bomber and fighter force that defeated the Luftwaffe, SAC retained a long-range air-to-air capability consisting of its own escort fighter aircraft until the late 1950s.[19] From the beginning, though, the short range of these fighters presented a problem. As the bombers reached intercontinental ranges, it became increasingly difficult to manufacture a fighter with the range to escort them. The development of air-to-air refueling seemed to solve this problem—and to some degree it did. However, by then SAC had lost interest in fighters, and tactical aircraft made the only gains in fighter range.

Regrettably, air-to-air refueling only appeared to solve the range problem for fighter aircraft. No equivalent increases in range have occurred since then. Crew fatigue has become the primary limiting factor. Simply put, a single-seat fighter is a very uncomfortable place after only six or seven hours of continuous flying. Given a fighter's maximum cruising rate as something just short of the speed of sound, the combat radius of a typical single-seat fighter aircraft, even with air-to-air refueling, falls far short of intercontinental range.[20]

Fundamental Restrictions on Range

Basic physics limits solutions to both the fuel and crew fatigue problems for fighter aircraft. In a sense, we are approaching the limits of what we can do with chemical fuels. To obtain the energy necessary to propel them to intercontinental distances, aircraft must carry substantial weight in the form of fuel. In fact, more than half the total weight of a fully loaded long-range bomber aircraft is its fuel.[21]

From World War I to the present, fighters have depended heavily on maneuverability, acceleration, and speed to allow them to get into a position to shoot down opposing aircraft.[22] Adding fuel capacity is the most obvious way to increase their range.[23] Similarly, the most transparent way of solving the problem of crew fatigue involves adding an additional crew member or increasing space on the aircraft so that the pilot can rest either en route or on station—or both. Adding space and fuel capacity essentially equates to increasing the aircraft's weight, which adversely affects maneuverability, acceleration, and even speed. Hence the dilemma: adding weight to gain range compromises air-to-air performance.

More than anything else, this has irreconcilably constrained attempts to increase the unrefueled range of a fighter aircraft. Indeed, the unrefueled range of a vintage P-51 Mustang is not substantially different than that of the modern F-22.[24]

Theoretical Views and Divergence from Theory

Giulio Douhet's classic work *The Command of the Air*, originally published in 1921, promoted the "battle plane" as the best type of aircraft with which an air force could attain "command of the air."[25] In his view, such an aircraft was heavily armored and armed, having a greater range than bombers but not remarkable speed, compared to that of pursuit planes used in World War I. However, in World War II, though heavily armed, bombers could not consistently shoot down enough attacking fighters to defend themselves. Additionally, given the practical limitations on aircraft

armor (i.e., unwanted weight), aircraft have become light, delicate machines unable to withstand much damage from air-to-air or ground-to-air weapons.

Furthermore, in World War II most aircraft used either machine guns or rapid-fire cannons as air-to-air weapons. During the Vietnam War, though, air-to-air guided missiles made their debut, both in radar-guided and infrared heat-seeking versions, and the Air Force fielded some fighters without any gun armament at all.[26] However, missile-armed fighters of the Vietnam era had to maneuver to the enemy aircraft's six o'clock position before firing on it, much like gun-armed aircraft of the past.[27] Fighters not equipped with a gun proved deficient, so later models included that weapon.[28] Since then, practically all air-to-air missiles can engage targets from directions other than the six o'clock position and now do most of the maneuvering.

In retrospect, one might argue that the abortive move to all-missile armament was simply ahead of its time, at least in the air-to-air arena. In the last 30 years of American, Israeli (equipped with US aircraft), and British (Falklands War) engagements between fighter aircraft, missiles scored all of the air-to-air kills—the internal gun, none.[29] Reliance on fighter aircraft maneuverability over the last 40 years or so, however, caused fighter range to stagnate. Acknowledging that the fighter aircraft itself is only about 90 years old, perhaps after 40 years we should revisit the issue and consider forfeiting maneuverability in favor of operational range.

Alternatives for Establishing an Intercontinental Air-to-Air Capability

Over the years, we have seen many proposals for new long-range systems, most of which emphasized long-range "global strike" systems either to replace or augment our current long-range bombers. Few have worried much about air-to-air capability—and that attitude needs to change. Realistically, any global strike concept should include such a capability, and several paths could take us in that direction.

One alternative involves extending the range of a small, lightweight, highly maneuverable fighter-type aircraft. The other dispenses with maneuverability, utilizes a large airframe capable of carrying its own fuel for long-range operations, and mounts air-to-air systems on that airframe. Clearly, a brand new aircraft design would best serve either of these choices; however, current budget constraints relegate this ideal to something little more than fantasy. To a greater or lesser degree, both the bomber advocates' follow-on bomber and the fighter advocates' F-22 have already succumbed to budget realities. A new platform supported by neither camp has no chance. In reality, if the Air Force is to realize any intercontinental air-to-air capability in the near term, it will have to consist of relatively inexpensive modifications to existing systems. Thus, the most viable option seems to call for equipping at least a small number of B-1B bombers with a relatively long-range, off-the-shelf air-to-air missile system.

Extending the Effective Range of Maneuverable Fighter-Type Airframes

As mentioned before, theoretically, aerial refueling gives our existing fighter aircraft unlimited range, realistically limited only by pilot fatigue. (But rearmament of a fighter that carries only six to 10 air-to-air missiles and the matter of equipment reliability and maintenance also could present problems.) Thus, extending the range of existing aircraft primarily involves replacing the pilot of the short-range platform with a fresh pilot. Moreover, we must consider tanker aircraft, whose vulnerability increases the closer they come to a threat.

Obviously, replacing the pilot allows the short-range fighter to maintain its maneuverability. Since the aircraft would still depend on tankers to provide fuel for intercontinental flight, the added weight of fuel is no longer a consideration. Replacing the pilot involves either a literal exchange, which would require some sort of airborne aircraft carrier, or complete removal, as in a remotely piloted aircraft (RPA).

Airborne Aircraft Carrier

Over the years, proposals to build airborne aircraft carriers have resulted in the Navy airships of the 1930s and the F-84 and F-85 parasite fighter programs, which attained various levels of operational capability.[30] These carrier initiatives envisioned large, long-range aircraft that transported fighter-sized aircraft to a launch position and then recovered them after they flew operational sorties.

A slightly different concept involves a "mother ship" that would rearm the fighter and switch pilots but would not normally carry the smaller aircraft to and away from the target area. Such a mother ship could service numerous fighters, which would depend on air refueling and their own engines to fly most of the distance to the target area. Essentially, this entails the next step from air-to-air refueling: air-to-air repiloting and rearming.

Unfortunately, neither the airborne aircraft carrier nor the mother ship exists. Modifying existing aircraft or designing and building new ones would incur considerable expense.

Remotely Piloted Aircraft

In the long term, removing the pilot from the airframe may offer the best solution. However, the RPA fighter has yet to reach operational status. We have built several prototypes, but apparently a number of so-far-undisclosed challenges remain, perhaps including the air refueling of an RPA and maintaining the data link with it in order to control the aircraft during an air-to-air engagement in an electronic combat environment.

Air refueling requires difficult maneuvering in close proximity to aerial tanker aircraft and raises various safety concerns. Until air refueling becomes a proven capability for RPAs, they will remain relatively short-range systems.[31]

With regard to the data link, a remote pilot flies the Predator—our primary operational, fighter-sized RPA—via this means.[32] However, any enemy able to electronically jam the data link of an RPA fighter could render it an easy target in an engagement. Moreover, the control inputs are not instantaneous; that is, a latency (time lag) occurs between the remote pilot's input and the RPA's response.[33] Using a remote operator (standard operating procedure for the Predator) data-linked by geostationary satellite inherently involves substantial latency. Only by locating the remote operator closer to the RPA, preferably with a line-of-sight data link, could we overcome this problem.

A reusable, maneuverable, or nonmaneuverable RPA with substantial loiter time might eventually prove a useful addition to long-range air-to-air capability, but it remains some years away. It would probably require a long-range mother ship in nearby orbit, with the RPA pilot on board, to reduce jamming vulnerability and overcome the latency issue.

Giving Long-Range Systems Air-to-Air Capability

Although we can arm aircraft already capable of long-range flight, we have no real way of making them as maneuverable as smaller aircraft. If we can surmount the limitations of a nonmaneuverable "fighter," however, certain advantages accrue to a system that has its own long-range capability. We can either use an off-the-shelf long-range system or design and build such a system from the ground up as an "intercontinental fighter."

Modifying an Off-the-Shelf System

Possible off-the-shelf systems include long-range transports and bombers. Because many commercial and military long-range transports are in production, we could easily obtain them from different manufacturers. Similarly, off-the-shelf bombers already have some of the offensive and defensive systems that we might want in a "fighter"—and bombers may have a speed advantage as well.

Modified Airliner or Transport. Historically, proposals to produce a "missile truck" usually called for modifying an airliner such as the Boeing 747 to carry and fire many air-to-air missiles, in many cases leaving all the targeting to other aircraft. Needless to say, unless the other aircraft also has long range, this "buddy system" does not result in intercontinental capability. An Airborne Warning and Control System (AWACS) aircraft, modified to have a targeting capability, might serve as a "buddy" platform. Furthermore, the E-3 AWACS, a modified airliner, would lend itself to the other option, namely having an airliner-type aircraft with a self-contained, intercontinental air-to-air capability. Installing a fire-control radar and an air-to-air missile-launch capability on an E-3 AWACS or another airliner airframe would result in a self-contained, intercontinental air-to-air capability. The cost of modifying such aircraft for significant missile-launch capability and fire-control radar remains unclear, however.

Modified Bomber. Perhaps the most intriguing option concerns equipping an existing bomber with air-to-air capability. Since all three bombers in the US inventory have similar ranges and payloads, any of them, like the transport, could serve as a missile truck for carrying and launching air-to-air missiles, and, with the appropriate modification, any of them could target the missiles as well. The B-1 might be the best candidate for such a conversion. Indeed, fitting a B-1 with the radar currently used in the F-15E could give the bomber some capabilities similar to those of the F-15E but with vastly increased range and payload.[34]

Building a True Long-Range Fighter

Although designing and building an aircraft specifically as a long-range fighter or air superiority aircraft represent the ideal option, it is probably the most expensive one and would require substantial time to reach operational status. In concert with a true long-range air-to-air combat aircraft, we might develop RPAs to complement the overall system.[35] Either tankers or the long-range manned combat aircraft itself could refuel the RPAs to give them comparable range, and then a pilot on the combat aircraft could control them via a line-of-sight data link. This combination of RPA and long-range combat aircraft might provide the ideal synergy needed to take on almost any foreseeable adversary at intercontinental range. But the expense of developing such a capability, though perhaps no more than that of an aircraft carrier task force, would be extreme.

The Best Option

Given the realities of the situation, modifying the B-1 bomber for an air-to-air capability offers the best option. In the current political and budgetary environment, we probably could develop a true long-range air-to-air capability only by doing so quickly, at minimal cost, to get an operational aircraft on line before political support erodes, a requirement that favors the B-1. A program to develop a rudimentary operational capability within a year would require (1) installing in the B-1's nose radome an air-to-air fire-control radar capable of targeting, such as an off-the-shelf F-15E radar, (2) fitting it with an appropriate radar-guided missile, such as the AIM 120 advanced medium-range air-to-air missile (AMRAAM) (even though it lacks the desired range), and (3) setting up appropriate equipment in the crew compartment for operating the system and electronically inter-

facing the parts of the system.[36] If we use the B-1's weapon bays, equipped with rotary launchers currently used for air-to-ground weapons, one proposal from Boeing would enable each plane to carry 48 AMRAAMs, 16 in each weapons bay.[37] Eventually, the maximum ranges of AMRAAM-like missiles would vary from bay to bay.

The AMRAAM, however, has a relatively short range.[38] Eventually, the B-1 would require an AMRAAM or some other air-to-air missile with longer range that would take advantage of the bomber's ability to carry a larger missile and would reduce its vulnerability to a similarly equipped enemy fighter aircraft. A logical evolutionary progression would eventually culminate in a long-range B-1 multirole aircraft that could approximate all of the capabilities of the Navy's Aegis vessels but enjoy substantially better high-speed reaction and less vulnerability to enemy aircraft, submarines, and missiles. Mating such a long-range manned aircraft with an air-refuelable, AMRAAM-armed RPA could provide an even better solution to the problem of attaining intercontinental air superiority.

Conclusion

In many ways, the US Air Force and even manned heavier-than-air flight itself are still in their infancy, the former having existed for less than a century and the latter now moving into its second century. Clearly, despite repeated predictions of their impending demise, air-breathing platforms have certain militarily significant capabilities—such as range, speed, and persistence—that remain difficult to replicate by means of any currently available technology. If the Air Force wishes to stay viable, it must maximize its exploitation of these attributes and avoid unnecessary capabilities that hamper its ability to do so. Given the air-breathing aircraft's inherent long-range, high-speed capability, which the bomber and transport communities have long exploited, it seems that long range is an area we can further develop in the air superiority arena.

Manned, highly maneuverable fighter aircraft have been a fixture in air forces since the early days of World War I. Perhaps our continued fixation on the maneuverability (hence, short range) of these platforms will someday seem as antiquated as the importance of being able to fire machine guns through the propeller arc of planes during World War I. In any case, if the Air Force intends to maintain credibility, it must rise above the expeditionary, close air support air forces of the other services and bring to bear an air-to-air capability across intercontinental distances without depending on nearby but vulnerable foreign bases. ✪

Notes

1. An extensively modified B-1 could accommodate most of the capabilities of Aegis cruisers and destroyers (e.g., antiair, long-range strike, ballistic missile defense, antisubmarine, and antiship). The bomber could reach the operating area faster than a ship but would not have the ship's persistence. "Cruisers—CG," United States Navy Fact File, 28 October 2009, accessed 24 May 2010, http://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=800&ct=4.

2. We also need an airborne platform that can shoot down theater ballistic missiles at intercontinental ranges, but that topic lies beyond the scope of this article.

3. Space might provide this capability as well but probably not for several decades. With the exception of geosynchronous orbits, space offers only limited "persistence."

4. Whereas retired Air Force colonel Phillip Meilinger explores range and persistence in the context

of global strike, I address the air-to-air aspect of global strike, particularly in terms of attaining minimal capability in minimal time. Col Phillip S. Meilinger, "Range and Persistence: The Keys to Global Strike," *Air and Space Power Journal* 22, no. 1 (Spring 2008): 66, accessed 1 July 2010, http://www.airpower.au.af.mil/airchronicles/apj/apj08/spr08/spr08.pdf.

5. Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: Free Press, 1989), 19.

6. Marcelle Size Knaack, *Post–World War II Fighters, 1945–1973* (Washington, DC: Office of Air Force History, 1985), 140.

7. Maj James M. Ford, "Air Force Culture and Conventional Strategic Airpower" (thesis, School of Advanced Airpower Studies, 1993), accessed 1 July 2010, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA425510&Location=U2&doc=GetTRDoc.pdf.

8. Robert Farley, "Abolish the Air Force," *American Prospect* 18, no. 10 (1 November 2007), accessed 21 June 2010, http://www.prospect.org/cs/articles?article=abolish_the_air_force.

9. Dr. David R. Mets, "To Kill a Stalking Bird: Fodder for Your Professional Reading on Air and Space Superiority," *Airpower Journal* 12, no. 3 (Fall 1998): 74, accessed 1 July 2010, http://www.airpower.au.af.mil/airchronicles/apj/apj98/fal98/mets.pdf.

10. Giulio Douhet, *The Command of the Air* (1927; repr., Norwalk, CT: Easton Press, 1994), 18–19.

11. LTC Andrew B. Twomey, "What's Left of Douhet?," essay (Washington, DC: National War College, 1999), 5, accessed 1 July 2010, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA442704&Location=U2&doc=GetTRDoc.pdf.

12. Carriers and air bases located in the Middle East provided fighter escorts for the initial air strikes during Operation Enduring Freedom in Afghanistan. Additionally, one can argue that the United States established air superiority over Japan in World War II without an air-to-air fighter-like capability. Even so, US forces captured Iwo Jima specifically for that purpose since they could not do so from the B-29 bomber bases in the Mariana Islands.

13. Twomey, "What's Left of Douhet?," 7–9.

14. Richard G. Davis, *Bombing the European Axis Powers: A Historical Digest of the Combined Bomber Offensive, 1939–1945* (Maxwell AFB, AL: Air University Press, April 2006), 112, accessed 1 July 2010, http://www.au.af.mil/au/aul/aupress/books/Davis_B99/Davis_B99.pdf.

15. Ibid., 184.

16. Ibid., 184–201, 275–94.

17. Ibid., 290–94.

18. Walton S. Moody, *Building a Strategic Air Force* (Washington, DC: Air Force History and Museums Program, 1996), 63–66.

19. Walter J. Boyne, *Beyond the Wild Blue, A History of the United States Air Force, 1947–1997* (New York: St. Martin's Press, 1997), 107.

20. Ibid.

21. For example, a fully loaded B-52 can weigh approximately 488,000 pounds at takeoff. Ordnance might account for as little as 25,500 pounds (approximately the weight of a full load of 51 Mark 82 500-pound bombs). Fuel represents approximately 275,000 pounds, and the empty weight of the aircraft—about 187,500 pounds—makes up the rest. Hence the fuel weighs more than 10 times as much as the bombs, and about one and a half times as much as the empty aircraft. "B-52 Stratofortress," fact sheet, US Air Force, 23 April 2010, accessed 19 August 2010, http://www.af.mil/information/factsheets/factsheet.asp?id=83.

22. Mets, "To Kill a Stalking Bird," 75.

23. Davis, *Bombing the European Axis Powers*, 187.

24. Although an incredibly large number of factors affects aircraft range, various sources say that the range of a P-51 is approximately 2,000 miles, similar to that of the F-22. Some of these factors include altitude, the presence of drop tanks and/or external stores, and the weight of internal stores.

25. Douhet, *Command of the Air*, 117–42.

26. Mets, "To Kill a Stalking Bird," 86.

27. Ibid., 94; "AIM-9 *Sidewinder* Missile," United States Navy Fact File, 20 February 2009, accessed 1 July 2010, http://www.navy.mil/navydata/fact_display.asp?cid=2200&tid=1000&ct=2; and "AIM-9 Sidewinder," fact sheet, US Air Force, 27 January 2010, accessed 17 April 2010, http://www.af.mil/information/factsheets/factsheet.asp?id=78.

28. Knaack, *Post–World War II Fighters*, 277.

29. Mets, "To Kill a Stalking Bird," 73.

30. Col George D. Kramlinger, "Narrowing the Global-Strike Gap with an Airborne Aircraft Carrier," *Air and Space Power Journal* 19, no. 2 (Summer 2005): 85, accessed 1 July 2010, http://www.airpower.au.af.mil/airchronicles/apj/apj05/sum05/sum05.pdf.

31. Global Hawk currently has an intercontinental range of sorts. Certainly, the aircraft would have much more range if it were air refuelable. Global Hawk, as well as any other RPA, is a relatively short-range system compared with an air-refuelable version. Arguably, even a B-1-sized RPA wouldn't have the range of a B-1 unless it was air-refuelable.

32. "MQ-1B Predator," fact sheet, US Air Force, 29 June 2010, accessed 17 April 2010, http://www.af.mil/information/factsheets/factsheet.asp?id=122.

33. Col Bruce Emig, Headquarters Air Combat Command / A8Q, to the author, e-mail, February 2010.

34. It might even be possible either to simply use the existing B-1 radar or modify it. I have assumed a worst-case scenario of having to use a completely different radar. Use of the existing radar would make the change that much easier.

35. Emig, e-mail.

36. The first two developmental Joint Surveillance Target Attack Radar System aircraft deployed in 1991, during the first Gulf War, before they were officially operational, supporting Operation Desert Storm by detecting and locating enemy armor so that strike aircraft could attack. "E-8C Joint Stars," fact sheet, US Air Force, 28 September 2007, accessed 24 May 2010, http://www.af.mil/information/factsheets/factsheet.asp?id=100.

37. Lt Col Alejandro Gomez, USAF, Air Combat Command / A8I, to the author, e-mail, July 2009.

38. Combined with limitations on the B-1, the missile's short range would mean that an AMRAAM launched by that bomber would usually have less range than one launched by a fighter aircraft. Hence, opposing fighter aircraft with missiles having ranges equal to or greater than the AMRAAM's would put the B-1 at a disadvantage, even with its long-range radar shot. Optimization of the B-1 for low-altitude flight is responsible for this issue. The AMRAAM and other air-to-air missiles can take advantage of the high speed and relatively high altitude of the launching fighter aircraft. The B-1B is a very fast low-altitude aircraft, but its low-observable design features limit its speed and altitude. The higher it flies, the slower it goes. Hence, any missile launched from it gets less of a range boost than it would from a faster fighter aircraft.

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Closing the Irregular Warfare Air Capability Gap

The Missing Puzzle Piece: Rugged Utility Aircraft and Personnel

Lt Col George H. Hock Jr., USAF

As the Air Force considers its future concept of irregular warfare (IW), an introspective look at the past sheds light on multirole airpower ideas that apply today and that will remain in effect tomorrow. Presently a gap exists between the Air Force's IW doctrine and its capability. We now have an opportunity to strike a balance between maintaining overwhelming conventional airpower and creating an IW force capable of building partner capacity (BPC) in developing nations, giving them the appropriate resources and training to do the job right. Historically, the Air Force has never had much interest in maintaining a fleet of inexpensive, multirole, low-technology aircraft for counterinsurgency (COIN) and BPC. Since the days of Billy Mitchell, American airpower has emphasized technology that supports an inherently offensive and manifestly strategic outlook, thereby justifying the Air Force's existence as an independent military branch.[1] This ingrained service culture has persisted despite evidence that the Air Force also needs to become proficient in IW.[2] The service finds itself

struggling to acknowledge IW yet maintain a decisive advantage in conventional war. The Air Force did not plan for and was slow to recognize the IW demands of the current conflicts in Iraq and Afghanistan, which have created an urgent need to establish a more capable force. Aside from the 6th Special Operations Squadron (SOS), the Air Force has no means of performing simultaneous IW and BPC. Unfortunately, the 6th SOS, which has consistently faced opposition from conventional-minded aviators and other special operators, still lacks the staff and equipment that its founders envisioned.[3]

However, under Gen Norton Schwartz, current chief of staff of the Air Force, Airmen are at least discussing new IW concepts that involve evaluating small rotary- and fixed-wing airlift and light attack aircraft which both the Air Force and partner nations can operate.[4] Even though some reports suggest that, upon further evaluation, General Schwartz has abandoned the light attack and light airlift aircraft in favor of relying upon platforms already serving in the general-purpose forces, the Air Force will solicit bids to buy 15 light strike and surveillance aircraft for use as trainers for BPC.[5] Unfortunately, this does not approach the robust standing force capable of handling IW and BPC challenges worldwide that we will need. Major obstacles include a limited budget and restrictions on additional personnel end strength. In particular, the Air Force must overcome its tendency to develop an expensive technological solution, opting instead to build expanded capability by using experienced Air Force personnel to cross-train as air advisers who operate and maintain IW aircraft with partner nations. The IW effort needs multirole aircraft that are cheap, durable, versatile, and capable of short takeoff and landing (STOL). In the 1990s, creators of the 6th SOS suggested some proven, excellent platforms that could fulfill these roles.

Specifically, the Pilatus PC-6 Turbo Porter and the Basler BT-67 (a reengineered Douglas DC-3), available virtually off the shelf, meet the aforementioned requirements. The Air Force should develop and maintain a standing force of aircraft such as the PC-6 and BT-67, which can perform functions such as airdrop or airland and then quickly refit to conduct intelligence, surveillance, and reconnaissance (ISR) as well as light attack. Their versatility allows them to operate in remote areas with minimal support. Rugged and reliable, they are ideal aircraft for the IW mission. This robust standing IW force, equipped with a family of inexpensive aircraft designed to meet a variety of COIN requirements, should be manned by personnel who have proper COIN education and language training. This proposal would allow the Air Force to recover from the lack of foresight in Iraq and Afghanistan yet stand prepared to intervene proactively in future IW conflicts.

Special Operations Aviation: A Legacy of Neglect

Even though the US Army recorded the first use of aircraft in an irregular campaign (the 1916 Mexican Punitive Expedition), the US Marine Corps foresaw the utility of airpower as a niche capability.[6] Army aviators such as Mitchell and Benjamin Foulois entered World War I with the idea that airpower could make a decisive difference in conventional warfare. These men wanted the maximum number of air striking forces under the command of an air officer so as to obtain operational- and even strategic-level effects beyond the mere support of ground troops.[7] This vision was the genesis for justifying a separate Air Force; Airmen left behind any desire to employ airpower in IW. Airmen preferred not to participate in any airpower operation other than a strategic one. Unlike their counterparts in the Army Air Service, however, Marine Corps officers believed that aviation fulfilled a supporting role and emphasized IW to justify the Corps' continued existence.

Between the world wars, US Army Air Corps leaders envied the British Royal Air Force, which had gained its independence

in March 1918.[8] Brigadier General Mitchell realized he would have to prove that American airpower's offensive and strategic attributes justified institutional independence as well. Thus, upon entering World War II, the US Army Air Forces intended to use unescorted strategic bombing to strike enemy vital centers. After the bombers suffered appalling losses to the Luftwaffe, Army Air Forces leaders successfully altered their bombing strategy to include long-range fighter escort. However, the Pacific theater proved the largest stage for displaying the decisiveness of airpower, with the strategic bombing of Japan culminating in the delivery of two atomic weapons. Ultimately, the decisiveness of strategic bombing in World War II warranted creation of an independent Air Force in 1947.

These events set the strategic bombing paradigm for the Air Force, and the new service generated doctrine and policy to support this perception, to the detriment of any activity considered irregular. However, even a vast conventional effort such as World War II required IW, and the Army Air Forces initially found itself unprepared. In the Pacific theater, the First Air Commando Group performed a daring glider operation in conjunction with British special forces behind Japanese lines in Burma—a resounding success; nevertheless, conventional forces absorbed the group at the end of the war.[9] An Air Force built around state-of-the-art strategic bombing had little room for aircraft that conducted IW. According to prevailing thought, an Air Force prepared for large-scale conventional or nuclear war could certainly handle any small war or irregular conflict. However, in Korea the Air Force built three wings dedicated to irregular operations, only to deactivate them in 1957.[10] The service repeated this cycle of creating irregular squadrons for specific conflicts and dismantling them afterwards. In the early 1960s, under pressure from Pres. John F. Kennedy to create a "specialized capability for COIN," the Air Force created the 4400th Combat Crew Training Squadron, nicknamed "Jungle Jim" at Hurlburt Field, Florida.[11] Organized, trained, and equipped with World War II aircraft and gear, the unit sought to shoulder the mounting burden of COIN in Vietnam. A detachment of this unit deployed to South Vietnam to build and train an indigenous air force under the code name "Farmgate."[12] It performed adequately, but as the conflict grew, so did demands, until the entire effort shifted from a foreign internal defense (FID) mission with the South Vietnamese Air Force to a conventional effort conducted by the US Air Force. By 1965 the special air warfare effort had shifted its focus to supporting the vast conventional ground effort in Vietnam.[13] However, in 1974 special air warfare squadrons had dropped from a peak of 19 flying squadrons possessing 550 aircraft and 5,000 personnel to fewer than 40 aircraft total.[14] The Air Force should have learned from its Vietnam experience that airpower, though critical in small wars, is only one variable in a complex joint environment. Regardless, the service's leadership believed that in all cases, conventional airpower represented the decisive factor in warfare, provided the political masters imposed no restraints.

The lack of emphasis on irregular airpower reached a pinnacle in April 1980 with the Desert One hostage-rescue disaster in Iran, during which a Marine Corps helicopter crashed into an Air Force MC-130, killing eight Americans. A subsequent review of the mission laid the foundation for creation of Air Force Special Operations Command (AFSOC). By 1986 Congress had decided to reform the military in general by passing the Goldwater-Nichols Department of Defense Reorganization Act, which led to formation of the joint United States Special Operations Command (USSOCOM) in 1987, followed three years later by AFSOC.[15]

Within the first few years of its existence, AFSOC established the 6th SOS, dedicated to FID.[16] Despite this charter, the squadron remained at odds with USSOCOM leaders, who continued to neglect the FID mission throughout the 1990s.[17] The 6th SOS faced difficulty obtaining resources from AFSOC,

USSOCOM, and the Air Force. Nevertheless, over time it acquired more than 100 personnel and leased various aircraft prevalent in air forces worldwide. The concept entailed acquiring experienced instructor pilots, maintenance personnel, and other Air Force specialists and then training them in the sustainment and employment of aircraft commonly found in partner nations. This cadre of personnel received extensive language, culture, and COIN training before deploying to a partner nation to prepare its air force to better perform internal security functions. Founders of the 6th SOS envisioned a family of aircraft, including the versatile Pilatus PC-6 and Basler BT-67, among others.[18] Although acquisition of those planes proved politically unsustainable at the time, these types of aircraft would have supported solid concepts of IW. Unfortunately, for many years the 6th SOS did not expand significantly. The *Quadrennial Defense Review Report* of February 2010 identified a "persistent shortfall" of capability for training partner aviation forces, and, as a result, the Department of Defense will double its current capacity by 2012.[19] Yet, even this increase is modest because the tiny 6th SOS must cover aviation FID for the entire world. Clearly, the squadron is much too small to perform its mission, as evidenced by our experience in Iraq and Afghanistan.

How Critical Is It?

The demand for aviation FID and BPC continues to grow as the United States remains embroiled in two irregular conflicts in Iraq and Afghanistan, and as other small wars seem imminent. Although BPC activities are growing in importance, the Air Force's efforts remain ad hoc and late to the game. In both Iraq and Afghanistan, no comprehensive airpower strategy anticipated the need for IW or BPC upon completion of major combat operations. Dedicated progress with regard to indigenous air forces in those countries has occurred only recently—an effort undermined by the lack of concentration on IW and BPC in the Air Force before 2001.[20]

Iraq and Afghanistan suffer from a lack of airpower expertise, infrastructure, training, and the economic sustainment necessary to rebuild an air force, yet both need immediate air support for their daily COIN operations. Therefore, the US Air Force has provided the lion's share of air support for COIN functions of both the United States and partner nations. Unfortunately, modern air forces are expensive and complex, requiring intensive training programs to perform effectively, and their development takes time—a commodity that neither country has in abundance. Iraq and Afghanistan need personnel and aircraft capable of performing important COIN tasks—"small vertical [rotary] and fixed wing lift, and light attack"—and, more importantly, "armed overwatch," which provides persistent ISR capability and the ability to attack, all in one platform.[21] Personnel who operate these aircraft must understand COIN theory, lest they do more harm than good. The Air Force must instill in them proven COIN airpower concepts such as maintaining flexibility and initiative by surprise, as well as minimizing collateral damage.[22] The aircraft that these Airmen operate must be affordable, versatile, durable, rugged, and available for immediate employment.

In Iraq, Afghanistan, and elsewhere, such planes will operate with minimal maintenance support, often in remote areas without any infrastructure or even a runway. In addition, neither government can afford the high costs of operating jets. These fledgling air forces should therefore rely on simpler propeller-driven utility aircraft to conduct a variety of missions. That is not to say they should never possess jet aircraft but that they should prove themselves capable of operating and maintaining simpler multirole models for their internal security before establishing a more robust capability. The irregular air battle has no need for high-technology aircraft used to strike enemies decisively on a theater or global level. Rather, it requires relatively low-

technology aviation solutions to support ground troops fighting numerous, isolated small battles—a type of conflict that does not fit the conventional offensive, strategic, and independent paradigm to which the Air Force has subscribed for over 60 years.[23] That requirement is closer to the Marine Corps' emphasis on airpower to support ground troops. Even so, a successful outcome still relies upon two aspects of the Air Force paradigm: centralized control of air assets and leadership by an air-minded officer.[24]

Despite the Air Force's position as a clear world leader in technological airpower, it must embrace alternative and even low technology for the IW and BPC arenas.[25] The service should also emphasize irregular concepts and training as well as proven aircraft, based on the needs of partner nations.[26] Moreover, the Air Force must reevaluate its decades-old paradigm regarding conventional offensive airpower in the context of COIN.

Despite the Air Force's position as a clear world leader in technological airpower, it must embrace alternative and even low technology for the IW and BPC arenas.

The Way Ahead

Before the Air Force can begin to meet the challenge of IW, it has to accept the fact that this type of warfare is here to stay; therefore, the service should constantly prepare for irregular conflicts and BPC. The Air Force has a history of creating ad hoc units for irregular operations, only to dissolve them after the need is no longer acute. Breaking this cycle requires an institutional paradigm shift that allows a more balanced regular and irregular force. As previously discussed, parity has never existed between the two types of forces because Air Force leaders have not recognized irregular forces as strategically important. Encouragingly, current service leaders have acknowledged IW as a strategically significant challenge and have published doctrine on the subject. Air Force Doctrine Document 2-3, *Irregular Warfare*, notes that "irregular warfare is sufficiently different from traditional conflict to warrant a separate keystone doctrine document. . . . We intend this doctrine document to be broad, enduring, and forward-looking."[27] Secretary of the Air Force Michael B. Donley and General Schwartz state that "the Air Force must balance the requirements levied upon airpower in IW with the concurrent need to maintain decisive advantage in conventional warfare."[28] This is critical to the Air Force's attempts to remain relevant to current and future conflicts while maintaining its conventional power. Although general in nature, its IW doctrine lays a solid framework of key airpower functions such as FID and BPC. Obviously, then, the Air Force should build an organization based on irregular concepts and equipped to implement the envisioned doctrine. It is encouraging, however, that the chief of staff has given credence to the possibility of a paradigm shift occurring in the service.

Such a shift would not suggest that conventional airpower is no longer important to national defense but that we need a more balanced force able to carry out both regular and irregular operations. Still conceptual, the envisioned irregular force nevertheless lies within the realm of possibility for the world's most powerful air force. Before it can create that IW force, however, the Air Force must overcome its institutional predilection for "technology, individualism, and dogmatic theories."[29] Some proposals suggest creating two Air Forces—one based on cutting-edge airpower and dedicated to deterring peer competitors, the other based on proven technologies and concepts for IW.[30] In truth, we can build an irregular force relatively inexpensively from existing combat expertise within the Air Force. General Schwartz asserts that the "right kind of training and language skills" would allow us to use general-purpose forces in a versatile manner to prosecute irregular missions, including BPC.[31] However, the traditional Air Force outlook will be difficult to overcome because "without the emergence of bureaucratic acceptance by senior *military* leaders, including adequate funding for new enterprises and viable career paths to attract bright officers, it is difficult, if not impossible, for new ways of fighting to take root within existing military institutions" (emphasis in original).[32] Granted, the chief of staff is interested in changing the paradigm, but he is starting small—with a forecast investment of $694 million in Air Force IW capabilities over the next seven years.[33] The bulk of this money will go toward procuring light aircraft, thus giving rise to the question of how the service can build an IW force with such a small sum of money.

The answer lies in using the proven method of the 6th SOS but on a larger scale. As noted before, IW aircraft are relatively inexpensive, compared to existing platforms. With appropriate training, experienced aircrew personnel can quickly learn to fly much less complex aircraft and operate in a variety of environments. The Air Force's end strength will not likely increase to accommodate this critical mission, but we must make hard choices, just as we did when units of remotely piloted aircraft first demanded personnel. The primary group, consisting of people with maintenance, civil engineering, security forces, and advanced pilot skills, would receive COIN training as well as culture and language skills. But first, the Air Force must develop leaders who have a clear concept of airpower in a COIN role.

Air-minded leadership is critical to closing the gap between the Air Force's desire to build partner capacity and its nascent capability to do so. Selected leaders must possess a solid understanding of the challenges presented by building an irregular force in the United States and in partner nations. Personnel selected for this duty should include top officers and noncommissioned officers schooled not only in COIN but also in the tenets of airpower (centralized control and decentralized execution, flexibility and versatility, production of synergistic effects, a unique form of persistence, concentration of purpose, prioritization, and balance).[34] Although this sounds rather basic to US Airmen, the Air Force's air advisers have observed that the Afghan National Army Air Corps does not adhere to these tenets.[35] Currently, that tiny air arm persistently violates the tenet of central control by dispersing its forces to several regional ground commanders. Such a practice offers but one example of the lack of priority placed on the fundamental ideas essential to creating an air force. It is shocking to realize how the Air Force has allowed this egregious violation of an important airpower truth to marginalize the Afghan National Army Air Corps. Clearly, it must take steps to reverse this disturbing trend.

Specifically, establishment of an IW air force capable of ensuring the security of the state demands a comprehensive strategy.[36] The Air Force has devoted vast amounts of brainpower to developing its own such strategy to establish a superior, independent conventional force, yet it seems unwilling

to do the same for partner air forces. In military terms, strategy involves the use of resources to achieve a political goal, but the goal of establishing a credible air force for a partner nation continues to elude the US Air Force in IW endeavors despite its attempts to supply military resources. Perhaps the solution lies in significant investment in people armed with historical knowledge of airpower and COIN lessons, combined with the tenets of airpower. Some important characteristics of airpower in small wars, virtually absent from the current approach to constructing an IW/BPC force, include aircraft for performing such mundane roles as airlift, ISR, communications, agricultural support, pest control, and support to the democratic process.[37]

Currently, the Air Force's IW efforts tend to have a "warheads on foreheads" mind-set, emphasizing the high-technology aspects of remotely piloted aircraft gathering intelligence and conducting surgical, kinetic strikes. Even though these missions are certainly consistent with the service's extant technology and outlook, they have little relevance to ensuring that partner nations can perform these missions after the Air Force has departed. Based on historical precedent, no Air Force doctrine addressed the employment of airpower in IW or FID prior to 1 August 2007. The service tends to neglect situations in which it serves in a supporting rather than a primary role.[38] Because it is human nature to gravitate toward what we know or find comfortable, the Air Force favors offensive missions rather than support or even training roles.

In situations such as those we encountered in Iraq and Afghanistan, once we achieve air superiority (which occurs almost immediately), the Air Force's mind-set must shift. We need to realize that continued US offensive air operations may hinder the overall effort.[39] In the irregular fight, our forces must use air strikes precisely and judiciously, or they may do more harm than good. We must consider not only the frequency and accuracy of air operations but also the originator of those attacks.[40] The political effect of using the indigenous air force's aircraft to execute missions in combination with US forces could act as a powerful tool for winning the support of the people.[41] A critical aspect of COIN involves the host nation's government gaining and retaining legitimacy by giving the appearance of being in charge.[42] A credible air force goes a long way toward establishing this legitimacy. If a capable indigenous air force does not exist, then the US Air Force should assume responsibility for leading the effort to establish one. Unfortunately, the service's report card for Operations Iraqi Freedom and Enduring Freedom shows that we have missed this point.[43] Until 2008 the Air Force Airpower Summary listed US and coalition sorties but said nothing about operations and capabilities of the Iraqi Air Force.[44] Besides being horribly cost inefficient and retarding indigenous air forces, the Air Force practice of keeping a fleet of its frontline aircraft in the fight to occasionally employ a weapon in permissive airspace, akin to "hunting gnats with an elephant gun," reinforces the impression that coalition forces are imperialist.[45] The air forces of partner nations should carry out this irregular application of airpower, with assistance from the US Air Force.

Since most partner nations cannot afford specialized satellite-controlled ISR or expensive fighters and bombers, it seems logical that they acquire affordable, durable, and rugged multirole aircraft. In general, airpower's most important role in IW is support to other forces; thus, relevant airframes should deliver troops (via airdrop or airland techniques) and then have the persistence and versatility to provide ISR, command and control, and kinetic strike. These aircraft must be easy to maintain and fly, as well as inexpensive to operate. They must also have a STOL capability to operate in areas that usually permit only rotary-wing aircraft. Although austere countries like Afghanistan lend themselves to the use of helicopters for ingressing and egressing such rough terrain, a developing partner

nation will find that their higher cost, lower reliability, and slower speed often outweigh their utility.[46] A fixed-wing STOL aircraft can access most of the same landing zones as a helicopter and boasts greater reliability, durability, and versatility. In order to mentor air forces with such aircraft, the US Air Force's IW force should operate a fleet of the same types of platforms, and its aircrews must master the tactics, techniques, and procedures relevant to these aircraft. In this regard, the founders of the 6th SOS favor the Pilatus PC-6 Turbo Porter and the Basler BT-67.

Pilatus PC-6 Turbo Porter

A Swiss corporation founded in 1939, Pilatus Aircraft Limited describes itself as the world market leader in the manufacture and sale of single-engine turboprop aircraft.[47] The Air Force already maintains a relationship with Pilatus as a consequence of AFSOC's acquiring its PC-12 aircraft, converted for military use. Renowned for its unique STOL capability, reliability, versatility, and reputation as a rugged utility aircraft, the Porter is a light-lift, high-wing, single-engine-turbo-propeller, fixed-landing-gear, tail-dragger aircraft that can operate in all weather conditions and in all environments.[48] The fact that it can land in 417 feet (1,033 feet over a 50-foot obstacle) on a variety of surfaces, including sand, dirt, snow, and water, allows access to areas normally served only by helicopters.[49] Despite its relatively small 52-foot wingspan, the aircraft can carry a maximum payload of 2,646 pounds at an operating altitude of up to 25,000 feet and at a maximum rate of climb

Pilatus PC-6 Turbo Porter in Indonesia. (Photo courtesy of Pilatus Aircraft Limited.)

of 1,010 feet per minute.[50] Underwing tanks increase the Porter's endurance of over four hours to seven and a half.

Even more impressive is the versatility of the cargo compartment, equipped with large sliding doors on both sides and a removable floor hatch. The doors facilitate paradrops or easy cargo and passenger loading, and the floor hatch can be modified to accommodate an ISR sensor. The cabin layout supports 11 personnel in seats, or more on the floor for paradrops. Crews can rapidly refit the aircraft for other types of missions, including search and rescue, medical evacuation, or equipment ferrying. Furthermore, simply replacing the floor hatch with a trainable gun and hanging standoff weapons under the wings (or both) convert it into a gunship. The Pilatus has almost limitless potential in an IW role.

The legendary durability of the Porter offers perhaps the greatest benefit to the Air Force and partner nations. Its proven, reliable engine—the Pratt and Whitney PT6A—powers many other turbo-propeller aircraft, including the Basler BT-67. Designed for operation in adverse conditions by only one pilot, the rugged Porter can usually avoid "getting stuck" in remote areas. Requiring minimal logistical support, the aircraft is easy to maintain, thanks to its relatively simple modular design. This type of off-the-shelf aircraft, with some minor modifications, would cost far less than multiple specialized military models or helicopters. Thus, the Porter ideally meets the specifications of an IW aircraft.

Basler BT-67

An American company formed in 1957 and based in Oshkosh, Wisconsin, Basler Turbo Conversions produces the BT-67, a medium-lift, low-wing, twin-engine-turbo-propeller, retractable-landing-gear, tail-dragger aircraft designed to operate in the same environments as the Porter (except for water).[51] Much like the Porter, the Basler BT-67 offers a proven aircraft design based on that of a reengineered Douglas DC-3.[52] Basler remanufactures the DC-3 airframe, improves its engines and avionics package, and tailors the cargo compartment to meet customer requirements. The aircraft possesses remarkable STOL characteristics and a cargo capacity of 13,000 pounds. The landing distance for the BT-67 is 1,230 feet (1,980 over a 50-foot obstacle) at maximum gross weight—quite impressive for its size.[53] The maximum gross-weight climb rate at sea level of 1,075 feet per minute is very similar to the Porter's.[54] The more than five-hour (7.3 hours loitering) endurance en route increases to 10.5 (14.75 hours loitering) with extended-range tanks.

Basler BT-67 in Afghanistan. (Photo courtesy of Basler Turbo Conversions, LLC.)

The versatile cargo compartment features an optional oversize cargo door and multiple hatch openings for ISR. The aircraft can hold up to 40 personnel with seats, or more on the floor for paradrops. The BT-67 can also accommodate search and rescue, medical evacuation, and equipment ferrying. Perhaps most notably, the BT-67 can also function as a gunship. The modified DC-3 airframe, known in a previous variant as the AC-47 gunship (retired from the Air Force inventory and no longer in production), was the forerunner of the AC-130 now used by the Air Force. However, Basler will reproduce this capability in addition to other variants. The BT-67 can carry standoff weapons and an ISR package,

yet it can quickly revert to airlift or some other role.

This aircraft's version of the Pratt and Whitney PT6A engine simplifies logistics considerations for maintainers of both the Porter and BT-67 since the planes share many engine parts. The durability of the DC-3 and AC-47 is well known, and Basler boasts that the BT-67 improves the company's already impressive record. This rugged multirole aircraft requires only minimal support but supplies unparalleled flexibility and versatility at an affordable price. Together with the Pilatus Porter, the BT-67 could serve as the inexpensive core of a family of IW aircraft for both the Air Force and partner nations.

Putting It All Together

These two aircraft meet the needs of both the US Air Force and of partner nations' developing air forces with regard to fielding a family of platforms for IW and FID. Existing conventional aircraft not designed for the rigors of IW will not close the gap between the Air Force's doctrine and its capability for this type of warfare. Arguably, the rugged STOL attributes of the aircraft described above eliminate the need for expensive and difficult-to-maintain rotary-wing aircraft in developing nations. Additionally, those countries would not need smaller and faster propeller-driven attack aircraft because the PC-6 and BT-67 can provide the same kinetic capability. An IW family of aircraft featuring these two types would allow the United States to posture itself strategically to help partner nations anywhere in the world.

As the US Air Force comes to terms with its commitment to developing an IW force capable of BPC, it needs to look at the problem from a perspective that differs from its traditionally conventional offensive, strategic, and independent mind-set. Refusing to pursue airpower ideas outside its decades-old paradigm failed to serve the Air Force well in earlier IW conflicts. The service must not overlook this opportunity to finally balance regular and irregular airpower by building an IW force capable of BPC in developing nations with a proper model designed to perform effectively. Sound Air Force IW doctrine now exists, but the service's leadership must adequately resource an IW organization capable of executing the mission. The service possesses a wealth of combat-tested personnel who can master the necessary skills. Finally, the Air Force must resist the inclination to solve the IW problem by pursuing a purely technological and kinetic solution that developing partner nations cannot sustain. It should set a goal of creating a standing IW force equipped and trained to provide credible and appropriate support to partner air forces on a significant scale, consistent with US policy. The Air Force can remedy the situation with a more robust IW force, but we need a long-term commitment from leadership to ensure its viability. ✪

Notes

1. Dr. Wray Johnson (one of the founders of the 6th SOS), multiple interviews by the author, September 2009–March 2010.

2. Air Force doctrine defines irregular warfare as "a violent struggle among state and non-state actors for legitimacy and influence over the relevant populations. IW favors indirect approaches, though it may employ the full range of military and other capabilities to seek asymmetric approaches in order to erode an adversary's power, influence, and will." Air Force Doctrine Document (AFDD) 2-3, *Irregular Warfare*, 1 August 2007, viii, http://www.e-publishing.af.mil/shared/media/epubs/AFDD2-3.pdf.

3. Lt Col Wray R. Johnson, "Whither Aviation Foreign Internal Defense?," *Airpower Journal* 11, no. 1 (Spring 1997): 66, 67, 83, accessed 19 July 2010,

http://www.airpower.maxwell.af.mil/airchronicles/apj/apj97/spr97/johnson.pdf.

4. General Schwartz is the first Air Force chief of staff without a fighter- or bomber-pilot background and the first pilot with special operations credentials to occupy this position. Originally a C-130 Hercules pilot, he later flew the special operations MC-130E Combat Talon I. He has commanded special operations forces at the group, wing, and major command levels. He has also commanded non-special-operations and joint organizations, serving as director of the Joint Staff and commander of United States Transportation Command. His breadth of experience in the special operations and joint arenas makes him a unique paradigm-changing chief of staff. See "General Norton A. Schwartz," accessed 19 July 2010, http://www.af.mil/information/bios/bio.asp?bioID=7077. See also John A. Tirpak, "The Irregular Air Battle," *Air Force Magazine* 92, no. 8 (August 2009): 22, http://www.airforce-magazine.com/MagazineArchive/Documents/2009/August%202009/0809battle.pdf.

5. Greg Grant, "Schwartz Shoots Down COIN Plane," *DoD Buzz: Online Defense and Acquisition Journal*, 6 May 2010, accessed 6 May 2010, http://www.dodbuzz.com/2010/05/06/schwartz-shoots-down-light-fighter/?wh=wh.

6. James S. Corum and Wray R. Johnson, *Airpower in Small Wars: Fighting Insurgents and Terrorists* (Lawrence, KS: University Press of Kansas, 2003), 11.

7. James J. Hudson, *Hostile Skies: A Combat History of the American Air Service in World War I* (Syracuse, NY: Syracuse University Press, 1968), 303.

8. James L. Stokesbury, *A Short History of Air Power* (New York: William Morrow and Company, 1986), 98.

9. Corum and Johnson, *Airpower in Small Wars*, 475.

10. Ibid., 237.

11. Johnson, "Whither Aviation Foreign Internal Defense?," 70.

12. Ibid.

13. Ibid., 72.

14. Corum and Johnson, *Airpower in Small Wars*, 273.

15. History, United States Special Operations Command, 6th ed., 2008, 5, accessed 16 December 2009, http://www.socom.mil/SOCOMHome/Documents/history6thedition.pdf.

16. Foreign internal defense involves "participation by civilian and military agencies of a government in any of the action programs taken by another government or other designated organization to free and protect its society from subversion, lawlessness, and insurgency." Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through April 2010), 188, http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf. For a similar definition, see also AFDD 2-3.1, *Foreign Internal Defense*, 15 September 2007, 1, http://www.e-publishing.af.mil/shared/media/epubs/AFDD2-3.1.pdf.

17. James A. Bates, "The War on Terrorism: Countering Global Insurgency in the 21st Century," JSOU Report 05-8 (Hurlburt Field, FL: Joint Special Operations University, December 2005), 1, http://jsoupublic.socom.mil/publications/jsou/JSOU05-8batesWarOnTerrorism_final.pdf.

18. Johnson, interviews.

19. Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, February 2010), 30, http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf.

20. Brig Gen Michael R. Boera, "The Combined Air Power Transition Force: Building Airpower for Afghanistan," *Air and Space Power Journal* 24, no. 1 (Spring 2010): 16–26, accessed 1 August 2010, http://www.airpower.au.af.mil/airchronicles/apj/apj10/spr10/aspj_en_2010_1.pdf; and Maj Gen Robert R. Allardice and Maj Kyle Head, "The Coalition Air Force Transition Team: Rebuilding Iraq's Air Force," *Air and Space Power Journal* 21, no. 4 (Winter 2007): 5–14, accessed 1 August 2010, http://www.airpower.au.af.mil/airchronicles/apj/apj07/win07/win07.pdf.

21. Tirpak, "Irregular Air Battle," 23.

22. Corum and Johnson, *Airpower in Small Wars*, 195.

23. Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore, MD: Johns Hopkins University Press, 1989), 19.

24. AFDD 1, *Air Force Basic Doctrine*, 17 November 2003, 21, http://www.e-publishing.af.mil/shared/media/epubs/AFDD1.pdf.

25. Daniel L. Magruder, "The US Air Force and Irregular Warfare: Success as a Hurdle," *Small Wars Journal*, 2009, 7, accessed 29 November 2009, http://smallwarsjournal.com/blog/journal/docs-temp/272-magruder.pdf.

26. Ibid.

27. AFDD 2-3, *Irregular Warfare*, [ii].

28. Michael B. Donley and Gen Norton Schwartz, *The 21st Century Air Force: Irregular Warfare White Paper* (Washington, DC: Headquarters US Air Force, January 2009), 4.

29. Magruder, "US Air Force and Irregular Warfare," 6.

30. Lt Col Robert Spalding, "America's Two Air Forces," *Air and Space Power Journal* 23, no. 2 (Summer 2009): 51–56, accessed 29 November 2009,

http://www.airpower.au.af.mil/airchronicles/apj/apj09/sum09/spalding.html.

31. Tirpak, "Irregular Air Battle," 23.

32. John A. Nagl, *Counterinsurgency Lessons from Malaya and Vietnam: Learning to Eat Soup with a Knife* (Westport, CT: Praeger Publishers, 2002), 4.

33. Tirpak, "Irregular Air Battle," 24.

34. AFDD 1, *Air Force Basic Doctrine*, 27.

35. Col Todd R. Lancaster, interview by the author, September 2009.

36. Corum and Johnson, *Airpower in Small Wars*, 425.

37. Ibid., 425–37.

38. Maj Kenneth Beebe, "The Air Force's Missing Doctrine: How the US Air Force Ignores Counterinsurgency," *Air and Space Power Journal* 20, no. 1 (Spring 2006): 28, accessed 19 July 2010, http://www.airpower.au.af.mil/airchronicles/apj/apj06/spr06/spr06.pdf.

39. Maj William Brian Downs, "Unconventional Airpower," *Air and Space Power Journal* 19, no. 1 (Spring 2005): 20–25, accessed 19 July 2010, http://www.airpower.au.af.mil/airchronicles/apj/apj05/spr05/spr05.pdf.

40. Ibid.

41. Ibid.

42. Col John D. Jogerst, "Preparing for Irregular Warfare: The Future Ain't What It Used to Be," *Air and Space Power Journal* 23, no. 4 (Winter 2009): 68–79, accessed 19 July 2010, http://www.airpower.au.af.mil/airchronicles/apj/apj09/win09/win09.pdf.

43. Ibid.

44. Ibid., 75.

45. Ibid., 77.

46. Johnson, interviews.

47. "PC-6 Turbo Porter: Anywhere, Anytime in Any Environment" (Stans, Switzerland: Pilatus Aircraft, n.d.), accessed 10 August 2010, http://www.pilatus-aircraft.com/00-def/main/scripts/ckfinder/userfiles/files/Downloads/Brochures/Pilatus%20Aircraft%20Ltd%20-%20PC-6.pdf.

48. Ibid.

49. Ibid.

50. Ibid.

51. "BT-67, an Overview," Basler Turbo Conversions, accessed 13 December 2009, http://www.baslerturbo.com/bt_67_overview.html.

52. Ibid.

53. Mr. Tom Weigt, Basler Turbo Conversions executive, interview by the author, 3 August 2010.

54. Ibid.

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Air Component Campaign Planning

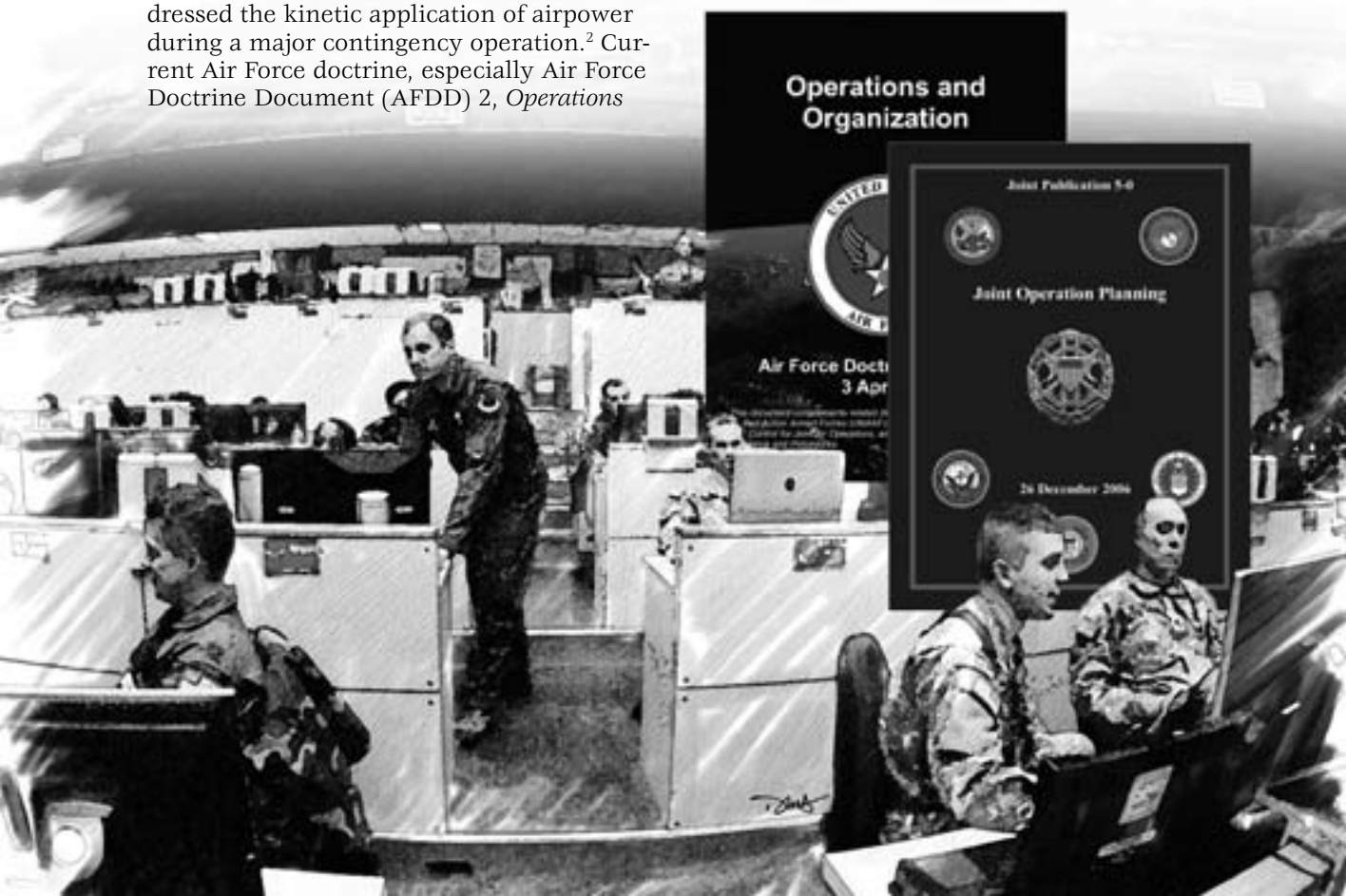
Beyond Conflict and Kinetics

Lt Col David Moeller, USAF

In the final analysis, victories are achieved because of the effect produced, not simply because of the effort expended.

—Brig Gen Haywood Hansell

The mission of the US Air Force—"to *fly*, *fight* and *win* . . . in air, space and cyberspace" (emphasis in original)—succinctly lists the domains "where" we employ but does not identify "when" we will fly, fight, and win.[1] Thinkers from Giulio Douhet to John Warden have typically addressed the kinetic application of airpower during a major contingency operation.[2] Current Air Force doctrine, especially Air Force Doctrine Document (AFDD) 2, *Operations*



and Organization, also develops the kinetic aspect.[3] Less well developed is the concept of theater air component campaign planning, similar to the campaign planning discussed in Joint Publication 5-0, *Joint Operation Planning*.[4] Although absent from AFDD 2, a theaterwide campaign planning methodology would prove well suited for the air component of a combatant command, based on the concept of the joint force air component commander (JFACC). As military forces spend more time performing a diverse range of activities beyond traditional warfare, it becomes increasingly important to develop a construct for air component campaign planning that spans the continuum of military operations and integrates cross-domain air, space, and cyberspace capabilities to meet the joint force commander's (JFC) objectives. As General Hansell observed, a campaign plan concentrates on the effects generated—through actions such as deterring adversaries, assuring allies, and preparing for kinetic operations—rather than on the intensity of operations. Ideally, future Air Force doctrine will reflect the increased scope and focus of air component campaign planning.[5]

Broadly stated, one should base an air component campaign plan on the authorities delegated to the commander, Air Force forces (COMAFFOR) and design it to (1) deter conflict with adversaries; (2) build air, space, and cyberspace interoperability with partner nations; (3) posture and prepare forces to conduct combat operations rapidly; (4) allow support organizations to better understand requirements; (5) guide tactical training and tactics development; and (6) influence service planning, programming, and budgeting. Current Air Force doctrine emphasizes planning for the rapid, kinetic application of airpower but lacks methodology for air component campaign planning that spans the continuum of military operations. To fill this doctrinal gap, the Air Force should develop an overarching concept of employment focused on long-term state interaction that ranges from peace through conflict to postconflict. By doing so, the operational air commander will be better aligned to support JFC initiatives with the distinctive capabilities and effects that air, space, and cyberspace bring to the joint fight. This article briefly outlines a framework for a campaign plan, highlighting preconflict planning and operations, in order to spur a holistic discussion about operational employment of air, space, and cyberspace as the Air Force continually refines operational concepts, ideas, and doctrine. This concept resembles the Army's combined arms employment and the Navy, Coast Guard, and Marine Corps' *Cooperative Strategy for 21st Century Seapower*.[6] Although many of the activities presented for illustrative purposes are not new, the overall methodology of an air-component supporting campaign plan and cross-domain integration is indeed new.

Foundations for Air Component Campaign Planning

> *Defense and diplomacy are simply no longer discrete choices, one to be applied when the other one fails, but must, in fact, complement one another throughout the messy process of international relations.*
>
> —Adm Mike Mullen
> Chairman, Joint Chiefs of Staff
> 5 March 2010

The US *National Security Strategy* (*NSS*) of 2010 sets the strategic approach for the use of national instruments of power in pursuit of the following enduring national interests: "the security of the United States, its citizens, and U.S. allies and partners; a strong, innovative, and growing U.S. economy in an open international economic system that promotes opportunity and prosperity; respect for universal values at home and around the world; and an international order advanced by U.S. leadership that promotes peace, security, and opportunity."[7] To maintain these enduring interests, the *NSS* lays out a strategy based on assuring and

working with partner nations, deterring adversaries, and continuing to act as the arbiter of international security:

> There should be no doubt: the United States of America will continue to *underwrite global security*—through our commitments to allies, partners, and institutions; our focus on defeating al-Qa'ida and its affiliates in Afghanistan, Pakistan, and around the globe; and our determination to *deter aggression* and prevent the proliferation of the world's most dangerous weapons. As we do, we must recognize that no one nation—no matter how powerful—can meet global challenges alone. As we did after World War II, America must prepare for the future, while *forging cooperative approaches among nations* that can yield results.[8] (emphasis added)

The *Unified Command Plan* directs combatant commanders to develop campaign plans to "[deter] attacks against the United States, . . . employing appropriate force should deterrence fail, . . . and execut[e] military operations, as directed, in support of strategic guidance [i.e., the *NSS*]."[9] The five geographic combatant commands all produce campaign plans or top-level strategies that closely mirror the interests and strategy laid out in the *NSS*. For example, Pacific Command's strategic concept mantra of "Partnership, Readiness, and Presence" drives objectives to "protect the homeland, maintain a robust military capability, develop cooperative security arrangements, strengthen and expand relationships with allies and partners, reduce susceptibility to violent extremism, deter military aggression, [and] deter adversaries from using weapons of mass destruction."[10] The other geographic combatant commands list comparable objectives. Like the *NSS*, combatant command strategies concentrate on maintaining military capability, cooperating and maintaining relations with partner nations, and deterring adversaries. These same three concepts serve as the foundation for developing a theater air-component supporting campaign plan.

Such a plan also arises from the continual interaction of states through peace and war and the assumption that uninhibited use of the global air, space, and cyberspace commons is a vital US interest.[11] This approach to operational planning is designed to provide a framework for supporting broader US diplomatic efforts over time and does not insist on producing effects during times of conflict. According to Gen Charles Wald, former deputy commander of US European Command, "U.S. European Command . . . is fighting a new kind of campaign in the global war on terror . . . engaged in a wide variety of operations and TSC [theater security-cooperation] activities. . . . This deliberate strategy of engagement is called *Phase Zero*, but in truth it is much more than just a new phase of systematic campaign planning; it is a new form of campaign in and of itself" (emphasis in original).[12] Joint Publication 5-0 identifies phase zero as a period for conducting operations designed "to dissuade or deter potential adversaries and to assure or solidify relationships with friends and allies."[13] Based on current operations across multiple combatant commands, the air component already conducts many activities to deter adversaries and assure friends and allies, but we have neither doctrinal guidance nor an overarching concept for combining these operations into an air-component supporting campaign plan. By joining General Wald's phase zero observations with current operations, we can develop a conceptual air component campaign model that provides air, space, and cyberspace integration across a range of military operations. Such a plan draws on the following propositions, which are consistent with current Air Force doctrine and practices.

Air Component Campaign Planning Depends upon Long-Term State Interaction, Not Conflict

Since the Treaty of Westphalia established the modern international state system in 1648, interaction among states has been central to achieving national objectives.

Everett Dolman writes that "battles and wars may end, but interaction between . . . states goes on, and 'one can no more achieve final victory than one can "win" history.'"[14] Taking a long-term view of state interaction, one sees that conflict amongst states is only one level of state interaction and that the majority of air, space, and cyberspace operations will occur during peacetime or after a conflict. This concept finds validation in the historical record, which shows that states strive to fulfill objectives and policies at the lowest level of military escalation. Similar ideas shaped the overall US strategy against the Soviet Union during the Cold War when containment, nuclear deterrence, and détente all sought to meet US objectives at a minimum level of military conflict. Similarly, air component campaign planning tries first to avoid conflict; second, win any conflicts that occur; and third, enforce postconflict termination criteria. This approach aligns with current US policy objectives and the guidance contained in the *NSS* and *Quadrennial Defense Review Report* of 2010.[15]

For plans and operations opposing nonstate actors such as al-Qaeda and other terrorist groups, the campaign plan should still insist on state interaction, which not only sets the foundation for building indigenous military capacity but also allows the United States to engage in such activities as overflights, basing agreements, and intelligence sharing directed against nonstate actors. For example, most activities against al-Qaeda in Afghanistan and Pakistan would remain impossible without approval from Afghani and Pakistani leaders.

Interaction between two states not only affects those states but also can have regional and even global repercussions, as one sees, for example, in Barry Buzan and Ole Wæver's regional security complex theory.[16] For instance, a US air exercise with Japan may negatively affect relations with South Korea or China. Consequently, it is important to view an air component campaign plan from a theater, or even global, perspective.

Cross-Domain Campaign Planning Geographically Spans at Least the Theater; It Can Be Global; and It Generally Does Not Focus on a Single State, excepting Times of Conflict

Unlike ground and maritime forces, airpower is not constrained by geographical boundaries: "The Airman's perspective normally encompasses the entire theater or joint operating area (JOA). There may be times when air and space power must focus on a specific geographic area to perform certain functions. However, it will most often be counterproductive for the air and space component to be assigned only to a specific area of operation (AO) if it is to remain flexible and versatile, able to mass effects wherever and whenever the joint strategy requires."[17] AFDD 2-2, *Space Operations*, observes that "space power operates differently from other forms of military power due to its global perspective," and joint doctrine defines cyberspace as "a global domain."[18] An air-component supporting campaign plan should view the air, space, and cyberspace domains as "global commons" that transcend geographical boundaries and afford commanders opportunities to create effects on a global scale.

Assuming That Space Power and Cyberspace Power, like Airpower, Are Inherently Offensive Limits the Ability to Develop an Air, Space, and Cyber Campaign Plan

The strategic bombing campaigns of World War II, the strategies of massive retaliation during the Cold War, and the success of the six-week air and space campaign prior to ground maneuver in Operation Desert Storm reinforced the writings of Douhet and the influential teaching of the Air Corps Tactical School and tended to portray airpower as inherently offensive. Instead, airpower is flexible and adaptable to the strategic and tactical environment. As British air marshal Arthur Tedder succinctly declared on the eve of the Normandy invasion in World War II, "The flexibility of an air force is indeed one of its dominant charac-

teristics."[19] The Battle of Britain during World War II, the Berlin airlift, and Strategic Air Command's alert posture during the Cold War represent nonoffensive uses of airpower that had both strategic and tactical implications. Current examples include global intelligence, surveillance, and reconnaissance (ISR) operations; ballistic missile defense operations; and integrated, multinational command and control of air and space forces. Times of conflict require the offensive use of airpower, as discussed in AFDD 2. However, during peacetime, defensive applications of air, space, and cyberspace power may prove significantly more important in providing security guarantees to partner nations and in deterring adversaries.

During peacetime, defensive applications of air, space, and cyberspace power may prove significantly more important in providing security guarantees to partner nations and in deterring adversaries.

Air Component Campaign Planning Is Based on the Authorities Delegated to the Commander, Air Force Forces

In general the JFC delegates to the COMAFFOR authority to serve as JFACC, area air defense commander (AADC), space coordinating authority (SCA), and airspace coordinating authority (ACA).[20] These authorities are well suited to the air component, based on command and control capabilities and possession of the preponderance of applicable forces. Additionally, each authority complements the others. For example, during Operation Iraqi Freedom, the positioning of ground- and maritime-based air defense assets under AADC authority affected development of the airspace control plan, development of air tasking orders, and flow of air assets (JFACC authority). The campaign plan should identify the decision points for each authority and the ways that decisions will affect operations under other authorities. Utilizing this methodology will assist in developing plans and operations that link air, space, and cyberspace together into a comprehensive operations plan. Hence, the JFACC, AADC, SCA, and ACA authorities should serve as the baseline for air component campaign planning.

Air Component Campaign Planning

During phase zero, the air-component supporting campaign plan should address three objectives: providing security guarantees to partner nations, deterring adversary actions inimical to US policy objectives, and logistically preparing the theater for possible combat operations.

Guarantee Security

Since the end of World War II, the forward basing of military personnel, theater security-cooperation activities, and bilateral or

multilateral exercises have reinforced US commitments to the security of partner nations aligned with US policy objectives. A campaign plan provides guidance on how these activities will improve the air, space, and cyberspace capacity of our partners and thus build interoperable and enduring relationships. This situation, in turn, proceeds from increasing US security and improving access opportunities for potential contingency operations. Security guarantees depend upon an understanding of the most important threats to partner nations. For South Korea, Japan, and countries in Western Europe and the Middle East, the most significant air threat may come from adversaries equipped with medium- and long-range ballistic missiles. Because the COMAFFOR has AADC authority, he or she should give particular attention to providing air and missile defense not only for US installations, but also for critical infrastructure and other assets of partner nations identified on the theater's critical asset list.

Space operations supporting this objective should focus on maintaining freedom of maneuver in the space commons for the United States, its partners, and its allies. AFDD 2-2 categorizes the relative degree of military advantage in the space domain as ranging from space parity to space superiority to space supremacy.[21] In order to guarantee security in the space domain, the campaign plan should ensure space superiority during phase zero while setting the conditions to gain space supremacy rapidly in the event of combat operations. This construct allows US and partner-nation space forces to conduct space operations via theater security-cooperation initiatives without prohibitive interference by an adversary. If conflict occurs, space supremacy allows a degree of space advantage "that permits the conduct of operations at a given time and place without *prohibitive* interference by the opposing force" (emphasis in original).[22] We can attain this advantage by conducting operations aimed at maintaining space situational awareness and sharing space-based ballistic missile defense capabilities. Generally, cyberspace operations supporting partner-nation security will rely on the scope of approved authorities. The cyber contribution should emphasize computer network defense, development of reliable and secure military cyber networks and infrastructure, and ISR collection and information sharing.[23] Because interagency and nongovernmental means could also produce these effects, the air-component supporting campaign plan should identify required support organizations, desired authorities for cyber operations, and applicable combatant command integration.

Deter Adversary Actions

With regard to deterrence, a central concept of US foreign policy, cross-domain planning must identify *whom* and *what actions* to deter. If we want to deter states, as we did the Soviet Union during the Cold War, we should turn to airpower's force posture and operations such as regional presence missions conducted by Global Strike Command or exercises with partner nations. An air component campaign plan will develop an overall strategy to deter adversaries as well as link the deterrent activities to actions designed to assure partner nations, as previously mentioned. Take, for example, a strong air defense posture, utilizing AADC authorities, that serves as a deterrent by establishing a defensive capability which effectively counters an adversary's offensive resources while protecting partner nations.[24] In many cases, successful deterrence by means of airpower will depend upon information operations against the adversary to ensure that we transmit the right message and that adversary policy makers receive and understand it.

Regarding the actions of nonstate actors, we must look to space or cyberspace operations for deterrent effects. The campaign plan will identify the interstate coordination requirements for space and cyberspace operations as well as the authorities needed to conduct operations within and above the state in which the nonstate actor resides.

These operations seek to give the nonstate actor information designed to create a perception that the cost of his actions will significantly exceed the expected gain. We can do this primarily by gaining information superiority with the intent to influence the decision calculus of the individual and then ensuring that we maintain situational awareness in the event deterrence efforts fail.[25] Cyber options could range from overtly manipulating the adversary's cyber architecture, to attacking supervisory control and data acquisition networks, to assuring that an adversary understands specific US offensive and defensive cyber capabilities. Prior to conducting overt cyber deterrent operations, both the supported commander and the supporting cyber command should carefully consider operations security options because they may trigger countermeasures that could undermine future cyber operations during combat.[26]

Prepare the Theater

Because potential adversaries have studied how the United States employed military forces during Operations Desert Storm, Allied Force, Iraqi Freedom, and Enduring Freedom, they may not allow America to initiate combat operations at a time of its choosing, preferring instead to catch it off guard and ill prepared for combat operations. Consequently, an air component campaign plan must contain logistics activities to transition the theater from phase zero to combat operations as rapidly as possible. Lt Gen William Hallin's assertion that "agile combat support creates, sustains, and protects all air and space capabilities to accomplish mission objectives across the spectrum of military operations" contains the essential elements to guarantee that air, space, and cyberspace forces can quickly move to combat operations.[27]Preparing the theater for airpower employment depends upon access to regional bases that can support a rapid buildup of personnel, aircraft, and support equipment. Conducting security-cooperation exercises can assist in establishing infrastructure and basing requirements for possible contingency operations. From a space and cyber perspective, preparing the theater ensures that the communication infrastructure (nodes, bandwidth, etc.) is robust enough to handle the expected increase in users when combat operations commence. In addition, phase zero activities should identify the requisites for protecting infrastructure from adversary attacks or attempted degradation. As illustrated by the alleged Russian cyberspace attacks on Estonia and Georgia, lack of cyberspace protection can significantly affect all elements of national power.[28]

The activities identified here are neither new nor significantly different than current operations in the majority of combatant command areas of responsibility (AOR). The difference lies in packaging these activities into a comprehensive air component campaign plan designed to provide security guarantees to partners, deter adversaries, and prepare for contingency operations. When coupled with effective strategic communication and information operations, many of the endeavors mentioned can attain multiple objectives. Because the overriding desire involves fulfilling policy objectives at the lowest possible level of conflict, phase zero activities may last for an indeterminate time. However, prudent military planning dictates preparing for combat operations in order to optimally support those objectives and understand how a transition from phase zero to combat could occur.

Events in Afghanistan since 2002 and Iraq since 2003 have demonstrated that in some instances, the air component of a joint force will conduct operations against nonstate actors who have gained freedom of maneuver because a weak or failed state lacks effective governance. David Kilcullen writes that an insurgency conducted by nonstate actors "is a struggle to control a contested political space, between a state (or group of states or occupying powers), and one or more popularly based, non-state challengers."[29] Nonstate actors gain power

and insurgencies tend to occur when a state either fails or collapses and the national government cannot supply basic security and services to the populace.[30]

An air-component supporting plan directed against nonstate actors should emphasize an effective phase zero strategy of engagement with a partner nation to assist in providing basic human-security assistance and increased security capacity of indigenous forces. The contribution can occur through sharing intelligence with the partner nation, increasing logistical capacity via air mobility, implementing tailored airpower capabilities, and developing a cyber infrastructure. For example, the communications infrastructure in many developing countries in Asia and Africa depends heavily on cyber capabilities. Having bypassed traditional telephone landlines, these countries rely upon the cyber domain for most telecommunications. In addition, many of them lack the transportation infrastructure necessary for economic development. As was the case in the taming of Alaska's frontier in the 1960s, air mobility may be the only viable, reliable transportation throughout a developing country. In many respects, the activities of the Combined Airpower Transition Force in Afghanistan and the Coalition Air Forces Transition Team in Iraq represent the types of operations that we could conduct *prior to* an insurgency to help partner nations proactively develop basic human-security capacity and infrastructure for the indigenous population in order to limit the influence of nonstate actors.[31]

The Transition from Phase Zero to Combat Operations

One of the most important parts of the campaign plan involves identifying "trigger events" that could precipitate the transition from phase zero to combat operations. By understanding such events, we could develop guidance for deterring them. In this case, the campaign plan should identify options for de-escalation, which will generally join with strategic communication and can range from cyber information operations, to reposturing of air assets, to conducting space-based ISR activities. The campaign plan must identify not only the de-escalation option but also its effect on conducting subsequent combat operations. The trigger events also help shape operational- and tactical-level crisis-action decision making during the initial stages of conflict and can provide a framework for determining how to prepare the theater logistically for potential combat. Finally, these events can serve as "starting points" for phase zero exercise scenarios.

For example, in late 1989 an Iraqi invasion of a Persian Gulf state and the subsequent threat to the vast Saudi Arabian energy facilities represented one of the most likely trigger events for rapid transition to combat operations in the Central Command AOR. It served as a scenario for command post exercises, and after Iraq invaded Kuwait in 1990, it influenced how the JFC and JFACC flowed forces into the theater and designed strategic communications and policy statements. This scenario also proved instrumental as a starting point for developing the joint air plan for Desert Storm.[32] Other examples of the value of trigger events include the scenarios used by the Air Warfare Center during Weapons School mission-employment graduation exercises and the Blue Flag command and control exercises. The Weapons School scenarios allow tacticians to develop techniques and procedures for supporting an operational plan, whereas Blue Flag seeks to "train combat leaders and supporting battlestaff personnel in command, control and intelligence procedures for specific theaters of operation."[33] Both training events benefit from and are heavily influenced by the identification of likely trigger events and the immediate operational requirements. From a cyberspace perspective, understanding events that will probably lead to combat operations can assist in determining the authorities necessary for a speedy transition from phase zero.

Documenting the Air Component Campaign Plan

The heart of any air planning effort is the joint air operations plan (JAOP), "the JFACC's plan for integrating and coordinating joint air operations," designed to carry out the JFC's objectives.[34] Although the JAOP typically concerns air operations, it can also provide top-level air component campaign plan guidance and strategy for all air, space, and cyberspace operations. At a minimum, the JAOP would contain a theater security-cooperation plan, exercise and engagement plan, and guidance for current contingency operations. For space operations, the JAOP would depend upon the JFC's delegation of space-coordinating authority to the air component commander and would identify the means of integrating and prioritizing space capabilities and effects to carry out theater objectives. It should offer enough detail and guidance to enable the joint functional component command (space) to develop a supporting joint space operations plan. The same considerations should apply to cyberspace content, which should include a listing of the integration and effects requirements over the course of the campaign that will assist in meeting phase zero objectives. In addition, the JAOP should identify the expected space and cyberspace authorities and expected command relations needed for rapidly moving to contingency operations.

Several source documents should supplement the JAOP. These include the area air defense plan, covering actions under the AADC authorities and the ACA airspace control plan. The scope of the area air defense plan and the airspace control plan should coincide with the geographic bounds of the AOR but may also contain guidance for coordination with other numbered air forces if potential threats originate outside the AOR.[35] Furthermore, the airspace control plan will develop air routes to support military operations and deconflict them from existing routes. The Hurricane Katrina (2005) and Haiti earthquake (2010) relief efforts showed that air routes may be the optimum way of quickly providing relief and military support to areas difficult to access.[36] Although the actual air routes may vary from those planned, the airspace control plan will offer a baseline for rapidly coordinating route usage with civilian agencies. Developing a foundational plan for air routes and air defense will furnish the methodology that the JFACC/AADC/ACA can use to transition to operations that demand air, space, and cyberspace employment (combat, humanitarian assistance, etc.).

Developed by subordinate units identified to support operations, base support plans are important to the JAOP.[37] These documents "support combatant command wartime operation planning, as well as [major command] supporting plans. [A base support plan] cuts across all functional support areas in a consolidated view of base missions, requirements, capabilities, and limitations to plan for actions and resources supporting war and contingency operations, including deployments, post deployment, and employment activities."[38] Base support plans contain information such as beddown and logistics support required for planned exercises, base support necessities for contingency operations, and other information that helps base leadership develop plans to support cross-domain operations. These plans must reflect an understanding of all the elements needed to move efficiently to contingency operations.

Air Component Campaign Requirements and Training

After the air-component supporting plan is approved by the COMAFFOR and submitted to the JFC, supporting commands and organizations should receive notice of its general requirements: (1) training air, space, and cyberspace forces; (2) developing and testing new technology to aid the war fighter; and (3) conducting long-range

planning, programming, and budgeting of Air Force assets. Further, campaign planning should include these organizations to ensure that the plan is feasible and supportable. If this coordination is not possible before approving the plan, planners should make every effort to see that the supporting agencies understand the needs of the final campaign. For example, the war fighter would coordinate with Joint Forces Command and its air component (Air Combat Command) to confirm the supportability of the time-phased force and deployment data and the identification of aircraft in the event of contingency operations. Air Force Space Command would coordinate space requirements and identify capabilities scheduled for campaign execution. As a service component to US Cyber Command, Twenty-Fourth Air Force would play an integral role in determining cyber capabilities and limitations to support the campaign plan.[39] Lastly, planners should coordinate the air-component supporting campaign plan with Headquarters US Air Force to ensure that senior leaders are aware of warfighter needs that will influence the prioritization of Air Force planning, programming, and budgeting decisions.

Conclusion

As the US military increases its participation in a wide range of operations, we must develop a campaign planning construct for the effective integration of air, space, and cyberspace capabilities that allow the JFC to support US policy objectives for long-term state interaction. Due to the global nature of the air, space, and cyberspace domains and the concurrent nature of military activities and diplomacy, the air-component supporting campaign plan is comprehensive in nature, guaranteeing security to partner nations, deterring adversary actions inimical to US policy, and preparing for rapid transition to contingency operations. As Gen Robert Kehler noted, "Instead of synchronizing at the *point* of the spear, the Air Force must start to integrate capabilities at the *handle* of the spear" (emphasis in original).[40] That "handle" is the planning process conducted by operational war fighters. By utilizing this campaign planning concept, they can better carry out the JFC's objectives; provide the requirements for servicewide prioritization of air, space, and cyberspace planning, programming, and budgeting; and supply a vector for training and readiness initiatives. ✪

Notes

1. "Air Force Mission," Official Web Site of the US Air Force, accessed 24 March 2010, http://www.af.mil/main/welcome.asp.

2. On Douhet's airpower views, see Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (1942; new imprint, Washington, DC: Office of Air Force History, 1983). The views of John Warden have steadily evolved over time; however, the preponderance of his written work concerns systems analysis related to planning for combat and kinetic operations. See John A. Warden III, *The Air Campaign: Planning for Combat* (Washington, DC: National Defense University Press, 1988); and John Warden, "Air Theory for the Twenty-First Century," in *Battlefield of the Future: 21st Century Warfare Issues*, rev. ed., ed. Barry R. Schneider and Lawrence E. Grinter (Maxwell AFB, AL: Air University Press, 1998), 103–24, http://www.airpower.maxwell.af.mil/airchronicles/battle/chp4.html.

3. Air Force Doctrine Document (AFDD) 2, *Operations and Organization*, 3 April 2007, http://www.dtic.mil/doctrine/jel/service_pubs/afdd2.pdf.

4. Joint Publication (JP) 5-0, *Joint Operation Planning*, 26 December 2006, http://www.dtic.mil/doctrine/new_pubs/jp5_0.pdf.

5. A campaign plan is "a joint operation plan for a series of related major operations aimed at achieving strategic or operational objectives within a given time and space." JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12

April 2001 (as amended through April 2010), 64, http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf.

6. US Department of the Navy, US Marine Corps, and US Coast Guard, *A Cooperative Strategy for 21st Century Seapower* (Washington, DC: US Department of the Navy, US Marine Corps, and US Coast Guard, February 2007), accessed 31 March 2010, http://www.navy.mil/maritime/MaritimeStrategy.pdf.

7. Office of the President of the United States, *National Security Strategy* (Washington, DC: White House, May 2010), 7, accessed 8 June 2010, http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf.

8. Ibid., 1.

9. Office of the President of the United States, *Unified Command Plan* (Washington, DC: White House, 5 May 2006), 3, accessed 8 June 2010, http://www.dod.mil/pubs/foi/ojcs/08-F-0518.pdf.

10. United States Pacific Command, *Strategy: Partnership, Readiness, Presence* (Camp H. M. Smith, HI: Commander, US Pacific Command, 2 April 2009), 8, accessed 5 June 2010, http://www.pacom.mil/web/PACOM_Resources/pdf/PACOM%20STRATEGY%2002Apr09.pdf.

11. On the concept of continual interaction among states, see Everett Carl Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (London: Frank Cass, 2005). On global air, space, and cyberspace commons, see Scott Jasper, ed., *Securing Freedom in the Global Commons* (Stanford, CA: Stanford University Press, 2010).

12. Gen Charles F. Wald, "New Thinking at USEUCOM: The Phase Zero Campaign," *Joint Force Quarterly* 43 (4th Quarter 2006): 72, https://digitalndulibrary.ndu.edu/cdm4/document.php?CISOROOT = /ndupress&CISOPTR = 19589&REC = 16.

13. JP 5-0, *Joint Operation Planning*, IV-35.

14. Dolman, *Pure Strategy*, 6.

15. United States Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, February 2010), 10–14, http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf.

16. Barry Buzan and Ole Wæver, *Regions and Powers: The Structure of International Security* (Cambridge, UK: Cambridge University Press, 2003), 40–92.

17. AFDD 2, *Operations and Organization*, 3.

18. AFDD 2-2, *Space Operations*, 27 November 2006, 2, http://www.dtic.mil/doctrine/jel/service_pubs/afdd2_2.pdf. For the Department of Defense's definition of *cyberspace*, see JP 1-02, *Department of Defense Dictionary*, 121.

19. Quoted in Charles Westenhoff et al., comps., *Vantage Points: Perspectives on Airpower and the Profession of Arms* (Maxwell AFB, AL: Air University Press, 2007), 16, http://www.au.af.mil/au/aul/aupress/Books/Westenhoff%203/Westenhoff%203.pdf.

20. As of 1 April 2010, the commander of US Central Command delegated these authorities to the commander of US Air Forces Central.

21. AFDD 2-2, *Space Operations*, 6.

22. Ibid., 7.

23. Maj Eric D. Trias and Capt Bryan M. Bell, "Cyber This, Cyber That . . . So What?," *Air and Space Power Journal* 24, no. 1 (Spring 2010): 90–98, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj10/spr10/aspj_en_2010_1.pdf.

24. This was the fundamental precept behind the Strategic Defense Initiative during the Reagan administration.

25. John Boyd's observe, orient, decide, act (OODA) loop is a key point for this discussion. The Air Force tends to ensure that operations are rapid enough to overwhelm the adversary's OODA loop, thus generating decision paralysis. In a deterrent scenario utilizing space and cyberspace, the OODA loop methodology remains valid, but the intent is to affect the "observe" phase in order to influence the individual's decision calculus and ultimately align it with US interests.

26. Maj Ann M. Halle, "Cyberpower as a Coercive Instrument" (master's thesis, School of Advanced Air and Space Studies, June 2009), 2, https://www.afresearch.org/skins/rims/q_mod_be0e99f3-fc56-4ccb-8dfe-670c0822a153/q_act_downloadpaper/q_obj_fd4c96ed-ac9e-4631-9901-b3adc1e23b4b/display.aspx?rs = publishedsearch.

27. Quoted in Westenhoff et al., *Vantage Points*, 44. General Hallin was the deputy chief of staff for installations and logistics from 1996 to 1998.

28. On the alleged Russian attacks, see Susan W. Brenner, *Cyberthreats: The Emerging Fault Lines of the Nation State* (Oxford, UK: Oxford University Press, 2009), 1–12 and 85–126. On the cyberpower targeting of national elements of power, see Franklin D. Kramer, Stuart H. Starr, and Larry K. Wentz, eds., *Cyberpower and National Security* (Washington, DC: Potomac Books, 2009), 465–556.

29. David Kilcullen, "Counterinsurgency *Redux*," *Survival* 48, no. 4 (December 2006), accessed 26 April 2010, http://smallwarsjournal.com/documents/kilcullen1.pdf.

30. Robert I. Rotberg, "The Challenge of Weak, Failing, and Collapsed States," in *Leashing the Dogs of War: Conflict Management in a Divided World*, ed. Chester A. Crocker, Fen Osler Hampson, and Pamela Aall (Washington, DC: United States Institute of Peace Press, 2007), 84.

31. Brig Gen Michael R. Boera, "The Combined Air Power Transition Force: Building Airpower for Afghanistan," *Air and Space Power Journal* 24, no. 1 (Spring

2010): 16–26, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj10/spr10/aspj_en_2010_1.pdf; and Maj Gen Robert R. Allardice and Maj Kyle Head, "The Coalition Air Force Transition Team: Rebuilding Iraq's Air Force," *Air and Space Power Journal* 21, no. 4 (Winter 2007): 5–14.

32. Tom Clancy with Chuck Horner, *Every Man a Tiger* (New York: Putnam, 1999), 207.

33. "Blue Flag," fact sheet, 505th Combat Training Squadron, accessed 25 March 2010, http://www.505ccw.acc.af.mil/library/factsheets/factsheet.asp?id=15317.

34. JP 3-30, *Command and Control for Joint Air Operations*, 12 January 2010, III-3, http://www.dtic.mil/doctrine/new_pubs/jp3_30.pdf.

35. For example, the air threat to US Northern Command's AOR may come from a country in US Pacific Command's AOR (North Korea), and the primary air threat to US European Command's AOR may come from a country in US Central Command's AOR (Iran).

36. Another example: the Berlin airlift.

37. Typically, any organization—such as an air expeditionary wing or air expeditionary group that reports to the COMAFFOR and that has responsibility for airfield operations, either as senior airfield authority or as the base operating support integrator—would develop a base support plan for cross-domain planning.

38. AFDD 2-4.4, *Bases, Infrastructure, and Facilities*, 13 November 1999, 54, http://www.e-publishing.af.mil/shared/media/epubs/AFDD2-4.4.pdf.

39. Hon. Michael B. Donley, secretary of the Air Force, and Gen Norton A. Schwartz, chief of staff of the Air Force, to all Airmen, memorandum, subject: Air Force Cyberspace Mission Alignment, 20 August 2009, http://www.af.mil/information/viewpoints/jvp.asp?id=498.

40. C. Robert Kehler, "Shaping the Joint Fight in Air, Space, and Cyberspace," *Joint Force Quarterly* 49 (2nd Quarter 2008): 35, https://digitalndulibrary.ndu.edu/cdm4/document.php?CISOROOT=/ndupress&CISOPTR=20482&REC=10.

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Developing US European Command's Intelligence, Surveillance, and Reconnaissance Strategy for Fiscal Years 2010 through 2015

Lt Col Kevin M. Coyne, USAF

[Intelligence] analysts . . . must open their doors to anyone who is willing to exchange information, including Afghans and [nongovernmental organizations] as well as the U.S. military and its allies.

—Maj Gen Michael T. Flynn, USA

Our number one priority is the current fight, which means the fight in Central Command," remarked Gen Roger Brady, commander of United States Air Forces in Europe (USAFE), highlighting a major challenge that faces most of the other theater component and combatant commanders.[1] As long as the United States continues to focus on Afghanistan and Iraq, the nation's war-fighting resources will remain dedicated to prevailing in those wars.[2] This article examines how America's emphasis on United States Central Command (USCENTCOM) adversely affects intelligence, surveillance, and reconnaissance (ISR) operations of other combatant commands (COCOM); it does so by analyzing United States European Command's (USEUCOM) ability to execute an effective ISR strategy in pursuit of its intelligence requirements. The article begins with a brief discussion of the impact of ISR operations in USEUCOM during the 1990s and then addresses national and Air Force–specific strategies and the ways they affect that command. Furthermore, it offers some tangible solutions designed to mitigate such problems as gaps in ISR collection, primarily caused by underresourcing, that, if adopted, would allow USEUCOM to better perform its critical ISR mission.

Specifically, the article suggests a three-tiered mitigation strategy: (1) a long-term solution in which USEUCOM's ISR planners alleviate the command's collection gaps by using the North Atlantic Treaty Organization's (NATO) Alliance Ground Surveillance (AGS) system, scheduled for delivery in 2014; (2) a midterm solution that calls for teaming with the British Royal Air Force (RAF) to begin planning the integration of US-purchased RC-135 Rivet Joint aircraft into USEUCOM's ISR collection profiles; and (3) a near-term solution whereby USEUCOM engages with the German Air Force (GAF) to develop tactics, techniques, and procedures (TTP) for combined post-mission processing of EuroHawk-derived signals intelligence to meet the command's ISR collection needs. Since most ISR assets continue to support USCENTCOM, other theaters competing for remaining scarce ISR resources (such as USEUCOM) should develop requirements-based strategies to better integrate current and planned allied capabilities and thereby offset their collection shortfalls.

Intelligence, Surveillance, and Reconnaissance in US European Command: The 1990s

USEUCOM enjoyed a high point of theater ISR collection operations in the 1990s due to the Balkans crises in Croatia, Bosnia and Herzegovina, and Kosovo. In 1995 the Bosnian civil war entered its third year; by that summer the international community had coalesced to put an end to the conflict, initiating an air campaign that primarily targeted the Bosnian Serbs' heavy weapons in an attempt to coerce them to the negotiating table. According to one study, "By obtaining needed combat information, ISR platforms played a key role in the planning, execution, and combat assessment phases of Deliberate Force," thus helping verify Bosnian Serb compliance with the international community's demands.[3] The U-2 and Predator in particular played key roles in monitoring the Bosnian Serbs' heavy weapons sites and assessing "whether the Serbs were withdrawing, or at least demonstrating an intention to withdraw."[4]

ISR contributed significantly to the success of Operation Deliberate Force—not only to real-time strike decisions but also to highlighting the contributions of allied ISR capabilities. In fact, "five nations employed 13 different manned or unmanned [reconnaissance] platforms for purposes that included monitoring the movement of heavy weapons out of the Sarajevo total-exclusion zone . . . towards the weapons-collection points, as well as making assessments of directed targets and battle damage."[5] British, French, German, and Dutch reconnaissance aircraft joined US

ISR assets in a combined air tasking order and contributed to the total information available to allied campaign planners.[6] Validating the criticality of both US and allied ISR assets to the joint and combined fight, Deliberate Force also demonstrated the seamless integration of allied ISR capabilities into US operations.

The Kosovo crisis spurred renewed violence in the Balkans from March to June 1999, affecting US ISR programs. It also had an impact on the availability of future ISR assets and accentuated shortfalls in connecting allied ISR capabilities to the United States' federated intelligence architecture. In an after-action report on Operation Allied Force, Gen Hugh Shelton, chairman of the Joint Chiefs of Staff, and Secretary of Defense William Cohen notified Congress that the Department of Defense (DOD) was increasing investments in ISR programs by approximately $1.09 billion (for sensors; aircraft; and tasking, production, exploitation, and dissemination [TPED] capabilities) in both supplemental spending and in the 2001 through 2005 budgets.[7] In their view, "better sensors along with improved processing and dissemination capabilities are needed to provide a capability to counter any future adversary."[8] The low-density/high-demand (LD/HD) nature of manned ISR aircraft such as the U-2 and the RC-135, which were "especially critical since they also support multiple intelligence activities in other areas around the world," heightened the need for more remotely piloted aircraft (RPA) and greater TPED capacity.[9] Thus, DOD leaders recognized how competing intelligence requirements impeded their ability to provide mission-ready ISR forces in sufficient numbers. Even if they managed LD/HD assets more carefully, they still could not guarantee their availability to all regional commanders.

Finally, the chairman of the Joint Chiefs of Staff and secretary of defense stressed that "the Department must develop a clear policy and implementation plan to explain when and how coalition partners can be connected to U.S. networks and when and how data can be shared with those partners."[10] In their view, increased reachback to US-based processing capacity represented one solution to the United States' problem with TPED. In addition, they believed that allied partners who contributed ISR assets to a joint and combined campaign should share in the intelligence output. We should take the recommendation from lessons learned in Kosovo one step further by having our allies integrate their sensor and TPED capacity into the US intelligence community's federated architecture and assist in the production process. The simple step of creating seamless US and allied intelligence production and information sharing, still not a reality 10 years following the Kosovo after-action report, could readily help the USEUCOM combatant commander begin to meet collection requirements that remain unfulfilled due to limited ISR resources.

Unfortunately, the DOD's calls for greater ISR investments and process overhauls did not come in time to meet the difficulties caused by the terror attacks of 11 September 2001 (9/11). Still reconstituting after Allied Force, US ISR assets and personnel surged to meet USCENTCOM's demands during Operation Enduring Freedom in October 2001. These accelerated activities exceeded steady-state operating levels for the service's ISR assets and continue to affect the needs of other COCOMs. Today, the majority of US ISR assets collect data for USCENTCOM, while residual assets meet the requirements of the other COCOMs on a shared or rotational basis.

Review of Intelligence, Surveillance, and Reconnaissance Strategy

US national strategy documents provide guidance for leveraging our allies' ISR capabilities to meet USEUCOM's needs. The *National Security Strategy of the United States of America* (2006) stresses nine essential tasks for safeguarding American and allied inter-

ests. This article seeks to mitigate three of those issues: combating global terrorism, defusing regional conflicts, and preventing the proliferation of weapons of mass destruction (WMD).[11] Aside from strengthening US intelligence capabilities—especially against the WMD threat—working with allied nations and strengthening relations with them are critical to carrying out these tasks. Leveraging NATO capabilities offers one way of making these partnerships even more effective.[12] For example, the *National Strategy for Combating Terrorism* (2006) calls for expanding partner capacity in the realm of intelligence and supplying friendly states with the training, equipment, and assistance they need to partner with the United States.[13]

The *National Intelligence Strategy of the United States of America* (2009) complements the two aforementioned national strategies with regard to priorities for the intelligence community writ large. The first two mission objectives outlined by the director of national intelligence deal with combating extremism and WMD proliferation, while the third objective concerns strategic intelligence and warning as well as monitoring events so that "policymakers, military officials, and civil authorities can effectively deter, prevent, or respond to threats and take advantage of opportunities."[14] Interestingly, the national intelligence strategy also calls on the intelligence community to improve collaboration and "conduct strategic outreach to key external centers of knowledge and expertise."[15] The director's message on utilizing allied partnerships is clear: we can achieve efficiencies of scale in meeting these global challenges only by collaborating with our allies.

Making use of and expanding allied capabilities as well as efficiently managing LD/HD ISR assets are DOD-level issues. The *Quadrennial Defense Review Report* (2006) attempted to address the problem of managing LD/HD assets and developing an ISR strategy by establishing a Joint Functional Component Command—Intelligence, Surveillance, and Reconnaissance under US Strategic Command to "synchronize strategy and planning and integrate all national, theater and tactical ISR capabilities."[16] This command is responsible for arbitrating competing collection requirements among other commands and allocating ISR resources, but with US intelligence concentrating on USCENTCOM, the command's processes do not guarantee an increase in assets for competing COCOMs. The 2006 quadrennial defense review (QDR) also addressed the criticality of bolstering allied capabilities and directed investments to establish NATO's planned intelligence fusion cell, which would reside within USEUCOM.[17] If used effectively, the cell could help meet the command's intelligence requirements.

The QDR of 2010 continues the trend of expanding the DOD's ISR capabilities through greater investments in "long-dwell [RPAs], such as the Predator, Reaper, and other systems."[18] Already on track to provide enough Predator and Reaper RPAs to raise the number of operational orbit areas in USCENTCOM from 37 to 50 by fiscal year 2011, the QDR of 2010 commits the Air Force to increase this number to 65 by fiscal year 2015; the Army will expand all classes of RPAs.[19]

The intention to use this additional ISR capability for counterinsurgency, stability, and counterterrorism operations creates problems for USEUCOM, however.[20] As Secretary of Defense Robert M. Gates pointed out during the official release of the 2010 QDR, "we have, to a considerable extent, stripped the other combatant commands of much of their ISR capability to put it into the fight in Iraq and Afghanistan. The reality is, there is huge demand all over the world for these capabilities—in the drug fight, here in this hemisphere, and a variety of places around the world."[21] As long as contingency operations in Afghanistan and Iraq continue, the QDR's planned increase in ISR investments will largely go to meet the requirements of those conflicts, and stripping ISR assets from other commands will proceed. However, the 2010 QDR does continue the theme of leveraging the capabilities of partner nations and learning from and training

with our allies: "As ongoing conflicts in Afghanistan and Iraq make clear, these dimensions of U.S. defense strategy have never been more important."[22] USEUCOM must look toward greater engagement with its allies to overcome intelligence-collection shortfalls and information gaps.

At the service level, the Air Force's security cooperation strategy of 2006 aligns with the director of national intelligence's vision of increased intelligence cooperation with partner nations. In fact, this strategy states that "intelligence relationships provide a means of unique access to data that the US might otherwise be unable to obtain."[23] If our partners were able to access such information, we could leverage their capabilities to realize US "global and regional objectives."[24] The security cooperation strategy speaks directly to USEUCOM's inability to satisfy all of its collection needs due to a lack of ISR resources; furthermore, from a larger DOD perspective, the strategy could serve as a possible blueprint to capitalize on allied capabilities to meet COCOMs' needs.

Air Force security cooperation objectives are important, but do they coincide with the Air Force's ISR strategy goals? Even though the service's ISR strategy of 2008 does not mention partnering with allies to satisfy national or COCOM collection demands, it does not contradict the Air Force security cooperation strategy. The ISR strategy does stress the criticality of "global cross-domain integrated knowledge dissemination."[25] The distributed common ground system's (DCGS) intelligence-processing architecture is the heart of cross-domain integration. Allies investing in ISR capabilities compatible with the DCGS, like the GAF's EuroHawk (RQ-4 Block 20), could easily integrate into that system's architecture. The Air Force's ISR strategy of 2010 already constitutes a shift toward this type of thinking. It not only stresses the importance of sharing TTPs with allies to improve interoperability and optimize the allocation of limited ISR resources, but also mentions current efforts to integrate the RAF and Royal Australian Air Force into the US Air Force's DCGS architecture.[26] Lessons learned from this process will prove useful in incorporating NATO and other key allies.[27] Thus, the path for eventually integrating the GAF's EuroHawk appears open, especially in a federated service-oriented architecture with multilevel security controls for postmission processing, as envisioned in the 2010 ISR strategy.[28]

USEUCOM's strategy of active security aligns exactly with three of the nine essential tasks found in the US national security strategy of 2006 (i.e., combating global terrorism, defusing regional conflicts, and preventing the proliferation of WMDs). Under its active security strategy, USEUCOM's mission statement calls for maintaining forces for global operations, securing strategic access and global freedom of action, strengthening NATO, promoting regional stability, and countering terrorism.[29] The command does this through two plans designed to prevent regional conflicts and through three functional plans, two of which are specifically designed to combat terrorism and prevent the proliferation of WMDs. The third functional plan, which focuses on theater force posture and transformation, deems teaming with partners just as important as maintaining theater security with a forward US presence. A USEUCOM report succinctly notes that "the posture of our forces and installations is shaped as much by our security cooperation activities as by our requirements for warfighting."[30] Thus, a large part of USEUCOM's strategic approach to dealing with regional threats involves "mitigat[ing] risk while the [United States] is at war through building partner capacity and enhancing interoperability."[31]

The Way Ahead: Utilizing NATO Capabilities

Though traditionally lacking in quantity and quality, the airborne ISR capacity of our European allies has seen significant improvement in both areas. As NATO prepares for the scheduled full operational capability

of its interoperable AGS system in 2012–14, increased cooperation with the alliance offers a potential long-term solution for USEUCOM's shortage of airborne ISR.[32] In September 2007, the 21 nations participating in AGS development abandoned an initial multiplatform concept in favor of a single air vehicle approach utilizing the RQ-4 Global Hawk Block 40. The Multi-Platform Radar Technology Insertion Program's ground surveillance radar will serve as the primary sensor.[33] The AGS's "core" segment includes line-of-sight and beyond-line-of-sight connectivity, as well as on-site data processing and exploitation capabilities. With Sigonella Air Base (AB), Italy, designated as the main operating base, NATO for the first time will enjoy dedicated ISR collection.[34] The most promising benefits of the AGS core segment, however, include its fully equipped interfaces and interoperability with national ISR systems that will enable it to become "a system of systems."[35] This is no small undertaking for NATO. Challenges in developing proper TTPs for platform and core-segment mission operations will abound.

Development will prove daunting because NATO's Intelligence Warning System, with the alliance's Situation Centre at its hub, is primarily an analytical function that relies on information feeds from a variety of sources. The latter include NATO-releasable messages from member states and information provided by the organization's political and military committees. Leaving NATO dependent on national architectures and unable to take advantage of potential synergies among those architectures, this structure offered little added value to the entities or nations providing the bulk of the information (i.e., the US intelligence community and USEUCOM).[36] In fact, "the ability of a nation to provide intelligence, the willingness of a nation to share this intelligence and the time required for this intelligence to be disseminated to NATO are all constraining factors which compromise the overall NATO intelligence effort."[37] The full operational capability of NATO's AGS in 2014 will change this dynamic. By acquiring an indigenous collection capability, NATO will be both a collector and producer of intelligence, no longer dependent solely on member states. European ISR strategists such as Klaus Becher see this as an opportunity for greater transatlantic cooperation and integration, through which "the goal would then be to make the most, for European purposes, of any future NATO intelligence analysis centres by attracting as much valuable US input with as little distortion as a result of US structural domination as possible."[38] To attain this goal, however, "Europe's terms of access to US-controlled intelligence pools on global security issues will also depend on the practical value of European assets to US intelligence."[39]

Fielding the AGS provides a unique opportunity to create the type of cooperative synergy envisioned by Becher, in which all stakeholders stand to gain meaningful outputs. For instance, the pending full operational capability of the AGS offers USEUCOM the chance to fill collection gaps. As DCGS stakeholders, USAFE and USEUCOM maintain the knowledge and expertise to conduct RQ-4 operations and postmission processing in their areas of responsibility. Both commands should engage with NATO now to develop the requisite TTPs for the proper core system utilization that the alliance currently lacks. This would make sense, given the projected US basing of three new Block 30 RQ-4s at Sigonella AB by October 2010.[40] In fact, "what makes Sigonella unique is the number of Global Hawk fleets due to take up residence there. Apart from the Air Force, the US Navy is likely to deploy Global Hawks at the base, while NATO plans to bring all eight of its Block 40 Alliance Ground Surveillance Global Hawks there."[41] Combined US-NATO Global Hawk operations and associated postmission processing could produce obvious synergies. By helping NATO employ its system, USEUCOM could make this European asset relevant to US intelligence operations.

Helping NATO develop TTPs for postmission processing offers a way of gaining entrée to AGS sensors, but USEUCOM should also advocate greater alliance use of US

intelligence-collection capabilities to foster the enhanced atmosphere of cooperation proposed by Becher. Expanded NATO access would improve the effectiveness of AGS operations and lead to a revolution in intelligence sharing, given the security classification barriers the US intelligence community currently uses to deter unwanted use. As a 2005 RAND study on reforming the intelligence process argued, "for the Intelligence Community, operational innovation must focus on changing and perhaps completely rethinking core functions."[42] In 2014 USEUCOM will be in a better position to leverage AGS capability by helping NATO navigate the uncharted waters of collecting and processing operational intelligence at the start of the AGS program. This initiative will produce far-reaching effects by complementing ongoing efforts of the Information Sharing Integrated Process Team sponsored by the DOD's ISR Task Force. Drawing largely on the experiences of working with our allies in Afghanistan, the team seeks to transcend cultural, technical, and security classification barriers that prohibit the free exchange of intelligence information with our allies.[43] At a minimum, the team's findings will lead to a transformation of the DOD's foreign disclosure and classification procedures, if not its core intelligence processes. USEUCOM could set the new standard for the DOD's information-sharing process with our allies.

The Way Ahead: Utilizing Bilateral Relationships

Existing bilateral partnerships contain mid- and near-term solutions to USEUCOM's ISR collection gaps. Many changes are under way in developing and fielding allied capabilities that promise to alleviate the previously discussed dependence on US systems. Both the RAF and GAF are in the process of leveraging and procuring the United States' ISR technologies to meet their national intelligence requirements. Nothing prevents USEUCOM and USAFE from working with our allies to fully integrate their systems into USEUCOM's ISR collection profiles and fill the command's collection gaps. Because of severe cost overruns of Project Helix, the replacement program for Britain's ageing Nimrod reconnaissance aircraft, the British approached the United States in 2007 to inquire about procuring three RC-135 Rivet Joint aircraft.[44] With congressional approval, the United States and Britain are now engaged in a foreign military sales contract to deliver all of these aircraft. Both Headquarters US Air Force and the director of national intelligence describe this effort as a "win-win" for both parties and an opportunity to improve integration.[45] Fully in line with national strategy direction to engage with allies and harness their capabilities, the main objectives of this contract address USEUCOM's "capability gaps through operational burden sharing" and focus on "maintaining and/or increasing manned signals intelligence support to CENTCOM and EUCOM [areas of responsibility]."[46] With the first aircraft scheduled for delivery in 2013, RAF aircrews are now in training on aircraft employment and utilization.[47] The RAF's RC-135 aircraft will provide a unique midterm solution to help satisfy USEUCOM's ISR collection gaps. That command should engage with the RAF now, through existing bilateral programs, to leverage Air Combat Command's in-theater RC-135 expertise at RAF Mildenhall to plan the integration of the RAF's RC-135 aircraft into its theater ISR collection profiles.

A near-term opportunity to overcome USEUCOM's shortfalls in collection presents itself in the GAF's fielding of the RQ-4 Block 20 EuroHawk RPA. After a transatlantic test flight and associated sensor demonstration from Nordholz, Germany, in 2003, the GAF signed a memorandum of understanding with the DOD in May 2006 that set the parameters for proceeding with a direct commercial sale contract for five RQ-4s.[48] The first EuroHawk vehicle rolled out on 8 October 2009 in Palmdale, California.[49] Current plans call for incorporating all five RQ-4 aircraft into the GAF's 51 Squadron at Jagel AB, Schleswig-Holstein, by 2011.[50] The GAF plans to use the RQ-4s in-theater

rather than deploy them to Afghanistan. Germany is also procuring the Heron 1, a medium-altitude RPA from Israel, for use in overseas contingency deployments. The GAF-operated RQ-4s will give USEUCOM a unique teaming opportunity to increase its ISR collection in-theater.

The United States can engage the GAF by offering its expertise in developing TTPs for postmission processing of EuroHawk-derived signals intelligence. Because the GAF procurement effort consists of the air vehicles only and not the sensors (in development by the European Aeronautic Defence and Space Company [EADS]), the Germans will not get a turnkey system. The electronic intelligence sensor demonstration in 2003 showed that the GAF will confront significant mission and postmission processing issues; according to a GAF spokesman, "there was surprise at the huge amount of radar emitters (merchant ships, airliners) that showed up in addition to the prepared profiles."[51] Once airborne, the electronic intelligence sensor began collecting data across a 500 km radius, downlinking a vast amount of sensor data that quickly overwhelmed the electronic intelligence ground support station (EGSS).[52] The GAF realized it had "more data than [it] could process. The EGSS urgently needs to be expanded in capability."[53] This situation offers an excellent partnership opportunity because a DCGS stakeholder like USEUCOM could offer tremendous expertise to help the GAF normalize RQ-4 operations and thereby gain access to GAF sensors. USAFE should expand its existing bilateral intelligence programs (traditionally focused on information sharing) to more dynamic agreements that include combined postmission processing opportunities with allied militaries such as the GAF. Completely in accordance with the Air Force's vision of a federated, multilevel, security-service-oriented architecture for its ISR capabilities, the initiative of integrating GAF operators into USAFE's DGS-4 deployable ground station—or, conversely, USAFE operators into the GAF's EGSS—would constitute a definite intelligence gain for USEUCOM by helping mitigate the command's gaps in ISR collection. The GAF, in turn, could use this partnership opportunity to enhance its EGSS capability smartly—a win-win situation for all parties.

Conclusion

Despite ongoing DOD investments in ISR platforms, these aircraft will remain LD/HD assets as long as the United States engages in combat in USCENTCOM. The Balkans conflicts of the 1990s proved that US and allied ISR capabilities are force multipliers in the modern battlespace, prompting senior DOD leaders to take the right step of calling for more ISR resources. These same leaders also acknowledged, however, that the increased demand for ISR would leave them hard pressed to field sufficient numbers of ISR assets to meet global needs. After the 9/11 attacks and subsequent surging of ISR forces to the USCENTCOM area of responsibility, competing COCOMs' ISR requirements could be met only by sharing those forces or rotating them through theaters. This is still the case—a dilemma that causes collection gaps in all commands. Both the national security and intelligence strategies, as well as the Air Force's security cooperation and intelligence strategies, recognize that the DOD's ISR forces and capabilities are stretched thin. National strategic direction advises war-fighting commands to partner with allies and utilize the latter's capabilities to help meet the needs of US national intelligence, a field in which we can easily realize synergistic efficiencies by cooperating with allies.

Given that Pres. Barak Obama's Afghanistan strategy calls for a surge in US forces and capabilities through 2011, USEUCOM must continue to look to other sources to mitigate its ISR collection gaps. In light of significant advances in allied ISR capabilities, teaming with NATO, the RAF, and the GAF offers a unique opportunity for USEUCOM to bring about a revolution in intelligence sharing that could prove to be a benchmark of security cooperation success for other COCOMs to emulate. ✪

Notes

1. Quoted in Michael Hoffman, "USAFE Bases Key to Building, Maintaining Ties," *Defense News* 24, no. 36 (21 September 2009): 26.
2. US Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, February 2010), iii, http://www.defense.gov/qdr/QDR%20as%20of%2026JAN10%200700.pdf.
3. Lt Col Richard L. Sargent, "Aircraft Used in Deliberate Force," in *Deliberate Force: A Case Study in Effective Air Campaigning*, ed. Col Robert C. Owen (Maxwell AFB, AL: Air University Press, January 2000), 234.
4. Ibid., 228.
5. Ibid., 223.
6. Ibid., 228.
7. US Department of Defense, *Kosovo / Operation Allied Force After-Action Report: Report to Congress* (Washington, DC: Department of Defense, 31 January 2000), http://www.dod.mil/pubs/kaar02072000.pdf. See "Message from Secretary of Defense William S. Cohen [and] Chairman of the Joint Chiefs of Staff Henry H. Shelton," p. 3 of 4.
8. Ibid., xxii.
9. Ibid., 54.
10. Ibid., 131.
11. George W. Bush, *The National Security Strategy of the United States of America* (Washington, DC: White House, March 2006), 1, http://www.comw.org/qdr/fulltext/nss2006.pdf. The national security strategy of May 2010 also addresses terrorism, regional conflicts, and WMD proliferation.
12. Ibid., 38.
13. George W. Bush, *National Strategy for Combating Terrorism* (Washington, DC: Executive Office of the President, September 2006), 19, http://www.cfr.org/content/publications/attachments/NSCT0906.pdf.
14. Office of the Director of National Intelligence, *The National Intelligence Strategy of the United States of America* (Washington, DC: Office of the Director of National Intelligence, 2009), 7, http://www.dni.gov/reports/2009_NIS.pdf.
15. Ibid., 8.
16. US Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, 6 February 2006), 56, http://www.defense.gov/pubs/pdfs/QDR20060203.pdf.
17. Ibid., 57.
18. US Department of Defense, *Quadrennial Defense Review Report*, February 2010, 22.
19. Ibid.
20. Ibid., 20.
21. "DoD News Briefing with Secretary Gates and Adm. Mullen from the Pentagon," Department of Defense, Office of the Assistant Secretary of Defense (Public Affairs), 1 February 2010, accessed 31 August 2010, http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4549.
22. Department of Defense, *Quadrennial Defense Review Report*, February 2010, viii.
23. Office of the Secretary of the Air Force, "Security Cooperation Strategy: Building Capacity, Integrating Capabilities, 2006," in *Air War College Basic Strategy Documents, AY10* (Maxwell AFB, AL: Air War College, 2010), 233.
24. Ibid.
25. Department of the Air Force, Office of the Deputy Chief of Staff for Intelligence, Surveillance, and Reconnaissance, *Lead Turning the Future: The 2008 Strategy for United States Air Force Intelligence, Surveillance and Reconnaissance* (Washington, DC: Headquarters United States Air Force, Office of the Deputy Chief of Staff for Intelligence, Surveillance, and Reconnaissance, 4 July 2008), 14, http://www.af.mil/shared/media/document/AFD-081201-007.pdf.
26. Department of the Air Force, Office of the Deputy Chief of Staff for Intelligence, Surveillance, and Reconnaissance, *Lead Turning the Future: The Vision and Strategy for United States Air Force Intelligence, Surveillance and Reconnaissance* (Washington, DC: Headquarters United States Air Force, Office of the Deputy Chief of Staff for Intelligence, Surveillance, and Reconnaissance, 19 July 2010), 24–25.
27. Ibid., 25.
28. Ibid., 7.
29. US European Command, "A Strategy of Active Security" (Stuttgart, Germany: Office of the Commander, US European Command, 2008), 2.
30. Ibid., 5.
31. Ibid., 3.
32. "NATO Signs Initial $26M Contract for AGS 'Eye in the Sky,'" *Defense Industry Daily*, 3 May 2005, accessed 31 August 2010, http://www.defenseindustrydaily.com/nato-signs-initial-26m-contract-for-ags-eye-in-the-sky-0450.
33. "NATO Alliance Ground Surveillance," Northrop Grumman, accessed 30 June 2010, http://www.as.northropgrumman.com/products/natoags/index.html.
34. "Alliance Ground Surveillance," North Atlantic Treaty Organization, accessed 30 June 2010, http://www.nato.int/issues/ags/index.html.
35. Ibid.
36. John Kriendler, *NATO Intelligence and Early Warning* (Camberley, Surrey, UK: Defence Academy of the United Kingdom, Conflict Studies Research Centre,

March 2006), 5–6, http://www.da.mod.uk/colleges/arag/document-listings/special/06(13)JK.pdf.

37. Ibid., 4.

38. Klaus Becher, "European Intelligence Policy: Political and Military Requirements," in *Towards a European Intelligence Policy*, Chaillot Papers no. 34, ed. Alessandro Politi (Paris, France: Institute for Security Studies, Western European Union, December 1998), [41], http://www.iss.europa.eu/uploads/media/cp034e.pdf.

39. Ibid., [42].

40. Tom Kington, "USAF Global Hawks to Patrol Europe, Africa from 2011," *Defense News* 25, no. 4 (25 January 2010): 26. As this article goes to press, the Global Hawks have begun to arrive.

41. Ibid.

42. Deborah G. Barger, *Toward a Revolution in Intelligence Affairs* (Santa Monica, CA: RAND Corporation, 2005), 119, http://www.rand.org/pubs/technical_reports/2005/RAND_TR242.pdf.

43. Briefing, Neill T. Tipton, Pentagon, Washington, DC, subject: ISR Task Force Information Sharing and Collaboration, August 2010, slide 5.

44. Briefing, Headquarters United States Air Force, Directorate for Intelligence, Surveillance, and Reconnaissance, Pentagon, Washington, DC, subject: US-UK RC-135V/W Rivet Joint Cooperative Program, 2009, slides 5–6.

45. Ibid.

46. Ibid., slides 9, 17.

47. Briefing, Aeronautical Systems Center, Pentagon, Washington, DC, subject: Rivet Joint 101, 21 July 2009, slide 9.

48. "Vorstellung des ersten Euro Hawk," Luftwaffe, 8 October 2009, http://www.luftwaffe.de/portal/a/luftwaffe/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLNzKId_dxB8lB2F7O-pFw0aCUVH1vfVP_NxU_QD9gtyIckdHRUUAl64xJQ!!/delta/base64xml/L2dJQSEvUUt3QS80SVVFLzZfMjBfR0xH?yw_contentURL=%2F01DB060000000001%2FW27WNAUE804INFODE%2Fcontent.jsp.

49. Ibid.

50. "Mit Adleraugen," Luftwaffe, 20 July 2007, http://www.luftwaffe.de/portal/a/luftwaffe/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLNzKId_cJAclB2QH6kZiiXs5IokEpqfre-r4e-bmp-gH6BbmhEeWOjooAVm-y1A!!/delta/base64xml/L2dJQSEvUUt3QS80SVVFLzZfMjBfMzAzMQ!!?yw_contentURL=/01DB060000000001/W27U5BL5218INFODE/content.jsp.html.

51. Joris J. Lok, "Global Hawk Demonstration Success Takes ISR Procurement One Step Closer," *Jane's International Defense Review* 37, no. 1 (January 2004): 62.

52. Ibid.

53. Ibid.

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Eagle of the Yi People

The Story of PLAAF Pilot Yang Guoxiang

Bob Bergin*

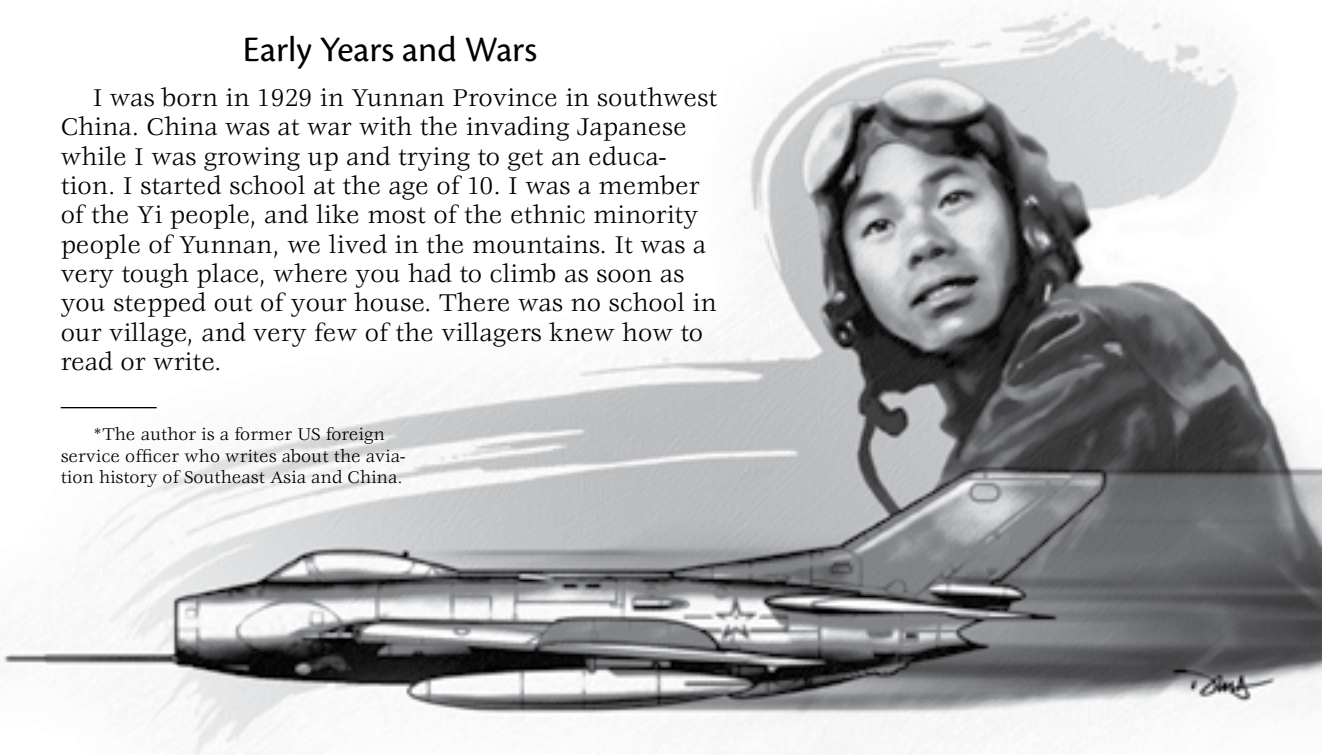
Yang Guoxiang's life mirrors the early years of the People's Republic of China, the rise of the People's Liberation Army Air Force (PLAAF), and China's incredible leap into the nuclear age. Yang was born 81 years ago in the remote mountains of Yunnan Province, a member of the Yi people, one of China's ethnic minorities. He grew up at a time of few opportunities for minorities, particularly in the technical and highly sensitive areas in which he would find himself. He struggled to get an education, becoming a guerrilla and then a soldier in the People's Liberation Army (PLA). He volunteered for flight training and became a ground attack pilot. When China started developing its own supersonic attack aircraft, he was selected as a test pilot, took a lead role in the aircraft's development, and was chosen for a special mission: the first test drop of China's hydrogen bomb. During the 1978 Sino-Vietnamese border conflict, he served as a senior PLAAF commander.

Yang told his story to Bob Bergin, who first traveled to China in 1995 and 1997 with pilots of the American Volunteer Group "Flying Tigers," "officially" visiting China for the first time since World War II. He returned to China regularly thereafter to research US air operations during World War II and, more recently, to explore the early development of the PLAAF through interviews with some of the pilots involved.

Bergin interviewed Yang in Kunming in early 2009 and again in 2010. Yang tells his story in his own words, with the assistance of interpreter Zhao Gang, an instructor at Yunnan University.

Early Years and Wars

I was born in 1929 in Yunnan Province in southwest China. China was at war with the invading Japanese while I was growing up and trying to get an education. I started school at the age of 10. I was a member of the Yi people, and like most of the ethnic minority people of Yunnan, we lived in the mountains. It was a very tough place, where you had to climb as soon as you stepped out of your house. There was no school in our village, and very few of the villagers knew how to read or write.



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My father worked in the tin mines, but he knew it was important to be literate. He urged the villagers to invite a teacher from outside to start a school for our village. They found one who taught the children for their first and second years. In my third year, I went to a bigger school in Eshan County. After that I went to a boarding school in a run-down temple for another three years. When I completed primary school, I was 15.

One day, near my home village in Yixi County, I saw two crashed Japanese bombers. They were on their way to bomb Kunming when they were intercepted by the American Volunteer Group Flying Tigers and shot down. One of the Japanese pilots was still alive, and I watched the Chinese Nationalist Kuomintang (KMT) soldiers search him. They hoped to find a pistol but found nothing. From that incident, I learned that there were Americans in the war who fought alongside the Chinese.

This experience did not have any effect on my becoming a pilot. My family was so poor they could not even afford rice. We lived on a diet of rice chaff and wild vegetables. I could not dream of becoming a pilot.

After finishing primary school, I had to interrupt my education. It was 1944, and the war against the Japanese was in its most difficult phase. The KMT government implemented a forced military draft. If a family had two brothers, one was drafted; if there were three, two were drafted. There were three brothers in my family. As the middle one, I was drafted when I was 15—too young, they decided, so they released me. My older brother worked in a tin mine, and the KMT could not find him. So my father was taken into custody. He was not released until the war against the Japanese ended.

When I turned 17, the legal age to be drafted, I knew I would be drafted again and sent to north China to fight the communists. The soldiers raided my home four times looking for me, but my friends among the sons and daughters of the town officials always warned me, and I was gone when the soldiers came. I knew the local hiding places very well.

Because I was afraid that the KMT soldiers would eventually find me, I ran off and became a migrant worker in Eshan. I lived in a hostel and did any work I could find. I dared not go home. One of my cousins studying at the middle school at Eshan helped me get admitted there, and I found myself in contact with the underground Communist Party.

Some of the teachers were university graduates. They raised my political awareness, and I started to absorb communist ideology. I wrote a little poem that criticized the corruption of the KMT government and posted it on a wall at the school. One of my teachers liked it very much. It happened that he was the secretary of the local Communist Party committee, and that incident led to my joining the party's local democratic youth alliance.

In November 1948, I participated in an armed uprising against the KMT. The party ordered us to retreat to the mountains. It was rough country. The only roads were horse trails, and the few vehicles we had ran on charcoal. We became guerrillas. I was made leader of a small unit tasked with mobilizing local civilians. In 1949 I formally joined the PLA. I was promoted to be the political instructor of the horse-and-mule transportation team of the PLA's Central Yunnan Independent Division.

The People's Liberation Army Air Force and the Korean War

In 1949 the People's Republic of China was founded. The PLAAF was established in the same year. At first the PLAAF had only aircraft that it had captured from the KMT or the Japanese. We had few pilots, so the Air Force set up aviation schools to train our own pilots. Most of the aviation schools were established in the northern part of China.

The PLAAF had been drafting pilots before the founding of the republic, but the start of the Korean War in 1950 accelerated the process. The former Soviet Union gave us aircraft but not pilots. Most of our pilots came from the PLA ground forces. At that time, I was serving in the military command in Yunnan and was one of 1,000 who signed up to join the Air Force. Candidates had to be military officers with combat experience and at least a primary school education, but good physical condition was the most important thing. I was one of only six candidates chosen, and after we were sent to Kunming for health checks, I was the only one remaining.

I was sent to Beijing in February 1950, and from there to the aviation school at Mudanjiang. Most of our instructors were former Japanese prisoners of war who had volunteered to help the PLAAF after the war. We also had former KMT members who had been captured by the PLA and had joined us. Our aircraft were Japanese and American types that remained from the war, like the PT-17 and the Japanese Type 99. Our training lasted just three months before we were sent to operational units. Only a third of the trainees became pilots. The others were sent elsewhere because of their poor performance or poor physical condition. Trainees with quick reflexes were assigned to fly fighter aircraft; the rest were sent to fly transports. When I finished training, I had 70 flight hours.

After graduation I was sent to fly ground attack aircraft, the Russian Ilyushen IL-10, a version of the famous IL-2 "Sturmovik" of World War II, which was also called the "flying tank." I was assigned first to the 22nd Division and later to the 11th Division, which participated in the Korean War.

After the Korean War started, we were sent to northeast China, to Kaiyuan, a city in Liaoning Province. We were ready to deploy across the border into Korea, but the American F-84s destroyed the airport we were to use, so we did not go. We became witnesses to the Korean War. From our base in China, we could see F-86s in the sky. We knew that most of the American pilots had thousands of flying hours while we Chinese pilots had only a few. In terms of experience, the Chinese pilots were children. Their only asset was their courage.

After the Korean War, we modified the MiG-15 to make it suitable for ground attack. Many of the aircraft the Soviets had given us were abandoned because of the short life of their engines. What finally convinced China to develop its own ground attack aircraft was the deterioration of Sino-Soviet relations in 1958. The Soviets withdrew their experts, and Soviet premier Nikita Khrushchev said that without Soviet help, the Chinese Air Force would become a Chinese ground force in three months.

We had great problems. We were short of aircraft and fuel. Most of our airplanes stayed on the tarmac for lack of fuel and spare parts. The lack of fuel meant that Chinese pilots could fly only about 40 hours a year. The recruitment of new pilots was suspended for several years. There were pilot trainees who graduated from flight school without ever touching an airplane. It would take years of arduous work, but China would develop its first military aircraft, a supersonic ground attack aircraft designated the Qiang-5 or Q-5, in Shenyang, the capital of Liaoning Province.

The Q-5

The chief designer of the Q-5 was a former KMT officer, Lu Xiaopeng, who had been sent to the United States in 1945 to study aircraft design and manufacturing. He stayed on the mainland after the KMT evacuated to Taiwan and was appointed chief designer of the Q-5. He used the Russian MiG-19 as his model. He adapted its features to create a ground attack aircraft with much greater range than the MiG. It was an enormous challenge, and he had to make many changes to the orig-

inal design. The fuselage, for example, was completely redesigned.

In 1965 I was one of four pilots chosen to participate in the Q-5 flight tests. I had never flown a supersonic aircraft. To make the transition to the Q-5, I was sent to fly the MiG-19 and then the upgraded MiG-19 attack version. In 1967 we were sent to Tangshan City in Hebei Province to fly the Q-5 and test its performance. In 1966 and 1967, I made over 200 flights in the aircraft. At the end, I prepared a report on the Q-5, its strong points as well as its flaws.

In 1967 a meeting was held in Beijing to discuss the feasibility of producing the Q-5. The meeting was the key to implementing the program, and I was ordered to attend. All concerned departments of the PLA, the national defense industry, and the scientific community were represented; many important people, like the PLA chief of staff, were there.

I was asked to speak. My boss told me not to raise any of the aircraft's flaws but to talk only of its good points. He was eager to move the Q-5 program forward, but I believed that everything we knew about the aircraft—including its flaws—was important. Then the commander in chief of the PLAAF told me to say what I thought; he said I was entitled to do that because I was the guy flying the airplane.

When I spoke, I repeated the issues that I had covered in my written report. Among them were the Q-5's problems, such as those related to the flight controls. The controls were hydraulically activated and responded very slowly to inputs because the hydraulic pressure was too low. That low pressure also made it difficult to retract the undercarriage when the air speed reached 330 kilometers per hour.

The meeting led to the production of the Q-5. Despite the turmoil caused by the Cultural Revolution then under way, the Communist Party of China's Central Committee decided to produce 250 Q-5s. I was appointed director of the Q-5 test-flight panel and named director of the Air Force Scientific Research and Development Department. I was concerned that I would not be able to lead such an important department. I felt I was too junior, but I knew I had good assistants that I could depend on.

Despite our best efforts, the Q-5 program lagged well behind our hopes. It was 1969 before the Q-5 passed all its tests and was declared operational. Although 250 were to be built, in 1969 there were only a dozen. The Air Force had planned to have a flyover of 18 Q-5s on the 20th anniversary of the founding of the People's Republic of China in November 1969, but we had only 12.

In the initial stages of the Q-5 program, there were delays because of factory accidents and the crash of the prototype aircraft. The delays frustrated everyone. The Cultural Revolution impacted the program. At a critical moment, we had a meeting. I spoke for four hours about the importance of developing this aircraft. I set a strict deadline for the more than 400 factories that were involved in the manufacturing process. And I did this in the name of Chairman Mao and the Cultural Revolution. That was how this undertaking proceeded. Premier Zhou Enlai had the final say in the program, and for that I was grateful.

Among the many problems was a mystery. China had imported an entire production facility from England. The British had used the factory to produce engines for a four-engine commercial transport. We wanted to use it to produce the engines for the Q-5 and other aircraft. The factory was being set up in Xi'an, when a huge explosion stopped everything. It was a great mystery. Was there a time bomb in the production line? Did a spy for the British government do this? It remains a mystery to this day. This incident cost the Chinese government hundreds of millions of dollars, and China was in no position to buy another factory to replace the one we lost.

Also at that time, chief designer Lu Xiaopeng was imprisoned. He was suspected of being a spy for Taiwan. His brother had fled to Taiwan with the KMT, and to make everything more complicated,

Yang with MiG-15

Lu had a French wife. In the end, it was Zhou Enlai who helped Mr. Lu get released.

Finally, in December 1969, I made the last operational test flight of this aircraft, and the plant was given formal approval to begin mass production. My work with this project was completed. I was named commander of an operational PLAAF unit, the 19th Division in Shandong.

Testing China's Hydrogen Bomb

During the Q-5's development, other important projects were under way. While we were still in the test-flight stage, the director of the Nuclear Weapon Research Institute came to talk with me about the performance of our aircraft. He spoke of a big, important mission. I really did not know what he wanted, but I started to sense that perhaps our aircraft would be included in some strategic program. He asked me about aircraft that could carry a big bomb, like the H-bomb, which was much bigger than any other bomb we had. I told him the advantages and disadvantages of our different aircraft and said that it might also be feasible to use the Q-5 to drop the H-bomb.

Later, when Zhou Enlai asked the director of the PLAAF Engineering Department about aircraft appropriate for an H-bomb mission, the director recommended the Q-5. With certain modifications, he said, the Q-5 could be used. That led to the question of a pilot qualified to fly the mission. In a regular bomber like the Tu-22, there was a crew of six, but on the Q-5 there was only one man. This man would have to be a highly skilled pilot, totally familiar with the Q-5, and politically acceptable. A report that the Nuclear Weapon Research Institute later sent to the Ministry of National Defense requested that I be named pilot for the mission. At the end of April 1970, I was told that the central government had decided to appoint me as the pilot who would drop the H-bomb.

I was then sent to meet with the director of the Nuclear Weapon Research Institute to be briefed on the H-bomb project and to discuss the Q-5's capability. The Q-5 had limited space inside its fuselage for weapons. The H-bomb was bigger than any other bomb we had: it was two meters long and weighed a ton. We discussed the problem for three days, and in the end decided the bomb could be carried externally. It would be slung under the fuselage—in a semi-recessed bay—and on a mounting that was like two hooks. Later we added a device that would push the bomb out so that it could not collide with the aircraft when we released it. This variant of the Q-5, modified to carry an H-bomb, was designated the Q-5A. Once that was settled, we believed we could drop the bomb by the end of 1970.

The bomb would not literally be dropped but "tossed" at the target. The technique we used was to approach the target at an altitude of 300 meters—to stay below the capability of most radars of the time—and at a speed of 900 kilometers an hour. When the

aircraft was 12 kilometers from the target, we would start a climb at an angle of 45 degrees. At precisely an altitude of 1,200 meters, I would release the bomb.

After the bomb separated from the aircraft, it would continue to climb to 3,000 meters and then start down. As the bomb climbed, it sped toward the target 12 kilometers away. It would take the bomb 60 seconds to reach the target and explode right above it. Meanwhile, as soon as the airplane released the bomb, it reversed course to escape the blast.

It required a very skillful pilot to do this well. Our target zone was 200 meters in diameter, which I could usually strike. Once in about 10 times, I could hit within 50 meters of the center. We had practice bombs that replicated the size and weight of the actual H-bomb but that were made of steel and cement. I dropped practice bombs 200 times.

Then in late 1970, we had a problem with the H-bomb itself. During a test at Lop Nor, the bomb exploded, but the expected atomic reaction did not occur. The H-bomb had failed; the cause would have to be investigated. My work preparing the Q-5A for the mission came to a halt. We had nothing to do at the nuclear weapon test base, so I returned to my unit in Shandong.

The next year, in September 1971, a political event occurred that eventually determined the timing of the H-bomb project. Vice-Premier Lin Biao was killed in an airplane crash while trying to flee to the Soviet Union after a failed coup attempt. There was an upheaval in the PLA, and to raise morale, Chairman Mao decided that we would drop the H-bomb that year.

The date of the mission was kept secret. Very few people knew the exact date that the bomb would be dropped. Once the date was chosen and Chairman Mao had concurred, all personnel at the nuclear site were restricted to base.

The director of the Nuclear Weapon Research Institute took me aside and privately briefed me on how powerful the bomb was and what I could expect when it exploded. He assured me that I would not be in any danger. Because of that and the many practice missions I had flown, I did not feel any different when I carried the live bomb.

On 30 December 1971, weather conditions were good. I took off from the air base in the late morning and headed toward the target, ground zero at Lop Nor, 300 kilometers away. I flew at 900 kilometers per hour and at an altitude of 300 meters, following the procedures we had established. Twelve kilometers from the target, I started my 45-degree-angle climb, and exactly at 1,200 meters I released the bomb.

Nothing happened! The bomb did not separate from the aircraft. The indicators on the panel showed that it was still attached. I turned back toward the target and prepared to do everything again a second time.

We had planned for emergencies. There were three separate release mechanisms, mechanical links to the bomb shackle, of which two were backups in case the first one failed. I tried all three; none worked.

On my second approach, I followed the same procedures, and again the bomb failed to release. I turned to try again. I made a third approach, and for the third time the bomb would not release. The situation was now critical. I was running short of fuel.

Before taking off, I had reviewed our emergency procedures. I had three choices: I could abandon the aircraft by parachute and let it crash in a remote area of the vast desert that surrounded the Lop Nor test site; I could crash-land the aircraft to assure that it was set down in a place where it would harm no one; or I could try to bring the aircraft back to base. I reflected on the time and effort that had gone into the H-bomb project and the great deal of money it had cost the Chinese people, and I made my choice. I would try to bring the airplane and the H-bomb back to base.

There was a great risk in doing this. There were 10,000 people on the air base although only a few knew about the mis-

sion I was on. If anything went wrong, thousands would lose their lives. The bomb under the fuselage would be hanging just 10 centimeters above the ground as I landed.

All radio stations in northwest China had been shut down during my flight, and all flights in the area were banned. I radioed the tower of my decision to return and asked that everyone on the base be evacuated into the tunnels that were dug underneath the base. It was Zhou Enlai who gave the order to evacuate. The deputy commander in chief of the PLAAF asked me whether I had anything else to say on the radio. I could tell him only that I would try my best to get the bomb back safely.

We could not be sure if there was a possibility that the bomb would explode if it contacted the runway during landing. There were five "safeties" that had to be deactivated to enable the bomb to explode. When the bomb was mounted to the airplane, the first safety was released. Fifteen minutes after the aircraft took off, the second safety was released. The third was deactivated when the aircraft reached the target zone. When the pilot decided to drop the bomb, he released the fourth. The fifth and final safety released automatically 60 seconds after the bomb was dropped, an instant before it exploded.

I was confident that I could set the airplane down gently. So I landed with the H-bomb hanging under me. It was a perfect landing. When I shut down the engine, there was total silence; I was completely alone. The airfield was deserted. All 10,000 personnel were sitting in tunnels under the ground. I could not leave the cockpit: there was no ladder for me to climb down from the fuselage that was high above the ground.

I called the tower and asked for help. The tower told me to work my way back to the tail and jump. The people in the control tower were angry; they thought I had put 10,000 lives at risk.

I had caused a big mess. When I notified the tower that I was returning with the bomb, the evacuation siren went off. It was lunchtime at the air base; everyone was sitting down and eating. They had to rush out, put on gas masks, and scramble into the tunnels. A big rice cooker caught fire because there was no one left to take care of the kitchen. Everyone who was there still remembers my name: I could have brought them their judgment day.

> I reflected on the time and effort that had gone into the H-bomb project and the great deal of money it had cost the Chinese people, and I made my choice. I would try to bring the airplane and the H-bomb back to base. . . . If anything went wrong, thousands would lose their lives.

It took a long time for anyone to come near my aircraft. Our procedures for dealing with the H-bomb meant we had to wear rubber shoes and clothing that would not create static electricity. No metal was allowed in the area of the bomb. Now that I had unexpectedly brought the H-bomb back, there were no service vehicles equipped with the required shielding. I sat out on the field for a long while.

After this failure, we sent the release devices to Beijing for analysis. Engineers determined that one reason the shackle malfunctioned was that the mechanism was

carefully kept in a heated area until just before it was mounted on the aircraft. This was not the usual procedure, but since this was the first release of a live bomb, everyone was being especially careful. When the aircraft took off into the cold air, it was possible that the sudden temperature change affected the tolerances on parts of the mechanism, causing its failure to release. The shackles and release mechanism were modified so this could not happen again.

The decision was to go again on 7 January 1972. Wind conditions were optimal. Weather at the Lop Nor site was good, but there was a cold front moving in. It was snowing at the air base when I took off.

This time there was no problem. I followed procedures, and when I released the bomb, it separated from the aircraft as it was supposed to. As soon as the bomb was gone, I reversed course to get far away from the blast zone and activated shields that would protect me in the cockpit. Then I saw the flash, a very big flash. The bomb exploded in the air, at a predetermined height above the ground. I felt the shock wave—it rocked me like a small boat in the ocean—and then I saw the mushroom cloud rising up into the sky. By that time I was already 20 kilometers away from ground zero.

Watching the mushroom cloud from the air, I could see how different layers of clouds inside the mushroom were connected to one another—just like smoke from a chimney. At that moment, I felt very happy. The test had been successful! Then I had to face my new concern—how to land safely on a snow-covered runway.

After I landed, I found little excitement at the air base. Because of the heavy snow, no one there saw anything—neither the great flash of light nor the mushroom cloud that the people near ground zero saw. The people near ground zero were very excited.

At a ceremony celebrating the project's success, I was cited for my contribution to China's nuclear development. Zhou Enlai said that bringing the bomb safely back after the first attempt was a miracle. I was given a high award by the PLA, but at the time it was kept top secret.

Yang Guoxiang

My name was kept secret for another two decades until I was formally acknowledged in 1999, at a conference commemorating the 50th anniversary of "Two Bombs and One Satellite," meaning the atomic bomb, the H-bomb, and an artificial satellite. These were the most important projects undertaken by the PLA after the founding of the People's Republic of China.

War against Vietnam

I went back to fly the Q-5 with operational units, and in late December 1978, when the Vietnamese Army invaded Cambodia, I was the acting commander of the

PLAAF's Fifth Division. Cambodia's ruler, King Norodom Sihanouk, sought refuge in China and asked for China's help.

In order to distract the Vietnamese from their occupation of Cambodia, China decided to escalate the level of conflict that already existed along its southern border with Vietnam, where the Vietnamese Army had been provoking clashes. I was ordered to deploy our entire force of 80 Q-5 ground attack aircraft to the border area.

Our confrontation with the Vietnamese was a major shift in Sino-Vietnamese relations. During Vietnam's war with the Americans, China provided great amounts of assistance to the Vietnamese, particularly to the Vietcong, which helped them liberate the southern part of Vietnam. But once that war ended, Sino-Vietnamese relations deteriorated very quickly. Now, as we faced the Vietnamese troops across our border, we found that they wore our uniforms, carried weapons we had given them, and ate rice that was grown in China.

The older generation of Vietnamese communists had affection for China and its people. They had been given refuge and training in China. Ho Chi Minh had studied at the Chinese military academy in Kunming. But the younger-generation Vietnamese leaders believed themselves much more sophisticated. They did not share their elders' views and had mixed feelings about the Chinese. They bore a grudge because China had cut its aid to Vietnam once the war with the Americans ended.

The border conflict would become a battle between ground armies. Our infantry crossed the border, but the PLAAF did not. Approximately 1,000 PLAAF aircraft were deployed to air bases in Tianyang, Nanning, Suixi, Lianming, and Yanshan. Most of these were Shenyang J-6s (the version of the Soviet MiG-19 built by the People's Republic of China) and the Chengdu J-7 (the version of the Soviet MiG-21 built by the People's Republic of China). Bombers were based in Nanning, Guangxi Province.

My division had two regiments. Within two days, we deployed a total of 80 aircraft, 100 pilots, and 1,000 maintenance and ground support personnel to the border area. All of the aircraft were Q-5s of the latest and most advanced type. We would remain deployed in Guangxi Province for almost five months. During that time, we had no accidents, and none of the Fifth Division's personnel made any serious mistakes. I was later awarded a medal because the division had carried out the mission efficiently.

Our primary mission was to fly reconnaissance along the border to maintain a watch on the Vietnamese Army. We flew our normal reconnaissance patterns at three different levels: at 1,000 meters, at 3,000 to 4,000 meters, and the highest at 10,000 meters. The purpose of using supersonic ground attack aircraft to fly these reconnaissance missions was to bring to the Vietnamese an element of what might now be called "shock and awe." The presence of 80 Q-5s just across their border would give the Vietnamese something to think about; the uncertainty would keep them off balance.

Our flights were routine, and we kept our Q-5s at a distance of 12 kilometers from the border. We never made any aggressive moves toward Vietnamese territory and never crossed into it. We knew, of course, that the Vietnamese were tracking our flights with their radars. We were not concerned about opposition from the Vietnamese Air Force, which was very small. It had a limited number of fighter aircraft, and those were kept in the Hanoi-Haiphong area for the defense of the capital and the seaport. When the Vietnamese saw the scale of the airpower that China could deploy against them, they dared not move aggressively against China in the air.

We arrived at the border with our bombing strategy already worked out and had selected targets in case the conflict escalated. We had no great concern about Vietnamese antiaircraft guns, even if we had been ordered to cross the border. We obviously soon got to know the topography of the border area very well, and we knew the loca-

tions of Vietnamese gun positions. We had a good appreciation of the weapons the Vietnamese used: their antiaircraft guns were all made in China. Nor were we concerned about Vietnamese surface-to-air missiles. They were not widely deployed at that time. We also knew that their range was fairly limited, and we calculated that if we did find ourselves where they were deployed, we could avoid them.

This was a war of infantry. China deployed large numbers of troops in many places along the border. When Chinese infantry drove their attacks into Vietnamese territory, they occupied Vietnamese soil for only short periods of time and then withdrew. The Vietnamese Army's biggest fear was that it could not know where the Chinese Army would launch an attack next. The front line was very long. The Chinese would launch attacks from different points along the border—sometimes from one province, sometimes from another. The Chinese strategy was to distract the Vietnamese from Cambodia, and in that we were quite successful. The Chinese Army tied down 11 Vietnamese divisions along the Chinese-Vietnamese border, making it impossible for the Vietnamese to deploy any more troops to Cambodia.

There was one incident toward the end of our deployment on the border when a Chinese aircraft crossed into Vietnam. It was a MiG-19 from the 18th Division of the PLAAF. I was not involved with the incident but heard about it and the pilot involved. The man was not a highly skilled pilot, and he bore a grudge against his unit because he had not been chosen to participate in the task force that would carry out missions during the engagement with Vietnam. He took off without permission, intending to defect to the Vietnamese. Unfortunately for him, the weather turned very bad. There was heavy rain, and his aircraft crashed off the coast of Vietnam. The pilot was a traitor who tried to carry out an act of revenge against a unit that did not trust his skill. He was killed when he lost control of his aircraft in bad weather. It was poetic justice.

Like other PLAAF commanders, I was under great pressure at the time because I was responsible for the political reliability of each pilot under my command. But I knew my pilots, and I could vouch for them and guarantee that none of them would defect to the other side. ✪

Yang continued to fly the Q-5 until he retired at age 50. After his retirement, he moved back to Yunnan Province and now lives in the provincial capital at Kunming. Q-5A number 11264, in which Yang flew the H-bomb tests, is on display at China's National Air Museum near Beijing. Many other Q-5s continue to serve with the PLAAF, 40 years after the plane's introduction.

Yang had a unique PLAAF career, but in many ways he was representative of the PLAAF's first-generation pilots. They came of age during the Japanese occupation and civil war. Early pilot candidates had to have combat experience with PLA ground forces. Many had little formal education, but they were disciplined and determined to forge careers that would help build an air force and a nation. When their country's Soviet ally abandoned it, they had to develop aircraft and weapons systems while making the best of diminishing resources. Despite that situation and political circumstances that did not encourage innovation or initiative, Yang and his contemporaries built the PLAAF into a modern air force.

A Government Ill Executed: The Decline of the Federal Service and How to Reverse It
by Paul C. Light. Harvard University Press (http://www.hup.harvard.edu), 79 Garden Street, Cambridge, Massachusetts 02138, 2008, 288 pages, $45.00 (hardcover), ISBN 978-0-674-02808-1; 2009, 288 pages, $18.95 (softcover), ISBN 978-0-674-0347-85.

A Government Ill Executed presents systematic inefficiencies in the federal bureaucracy and possible solutions. Author Paul Light drills down to institutional causes in order to seriously address the monumental problem of government inefficiency. The book belongs to a higher class of organizational-management literature than previous antibureaucracy diatribes because it details causes of inefficiency and provides significant statistical analysis to bolster Light's argument that a focused, streamlined government would be more efficient than the current one and would attract a higher-caliber public servant.

The author applies Alexander Hamilton's theory of good government to the present federal system. Instead of addressing government's limited mission to faithfully execute its laws, Light examines the paradox of unpopular, inefficient performance juxtaposed against an ever-increasing demand for more government services. Each chapter treats one of the seven Hamiltonian characteristics of good government as outlined in *Federalist No. 70*. Additionally, the concluding chapter, "Reversing the Decline," proposes ways to do just that: reverse the steady erosion of governmental capabilities instead of merely attack the federal service. The book serves as a blueprint for a true government reformer to reshape the federal service into a more efficient corps closer to its foundational roots as originally envisioned by Hamilton.

Based upon 10 years of Light's research conducted at the Brookings Institution and New York University, *A Government Ill Executed* attempts to rate the number of federal missions that represent a near-all-encompassing agenda. These missions, from after-school programs to national defense initiatives, are both starved and expanded for short-term gain by office seekers with little regard for the long-term consequences of execution. This accordion effect is reflected by a current department's 64 layers of leadership between the secretary and the associate deputy assistant administrator (most business firms recommend six layers). Although Light convincingly argues that more leaders do not mean more leadership, the table that presents such data is misleading since all federal departments' employment of appointees isn't exactly parallel. However, he does not weaken his argument by making trivial points about whether the Department of Agriculture has 60 positions and the Department of Defense has 65. His point is clear: a great deal of oversight hampers organizational efficiency.

One ratio is particularly scary: 90 percent of the Senior Executive Service is eligible to retire in 2016! Regarding the "retirement tsunami" of baby boomers leaving the federal workforce, which is already overwhelming the federal hiring process, Light suggests evaluating every vacated position and eliminating the ones no longer needed. Unfortunately, the process of evaluating positions may devolve into yet another bureaucratic creation: new positions to eliminate old positions.

Notably, the author fails to mention Frederick Winslow Taylor, the father of scientific management. Although Light does discuss multiple derivative studies based upon Taylor's work, the book nevertheless suffers from its omission of major (and likely valuable) input from an intellectual leader of the early efficiency movement. If the author wished to emphasize efficiency, he should have acknowledged Taylor's theories.

I recommend *A Government Ill Executed* even though it rehashes issues familiar to frustrated readers involved in working relationships with the federal government. However, Light pointedly observes that government will become more efficient only after thoroughly evaluating federal missions rather than merely tweaking them for short-term political gain. In turn, public service must make its careers more attractive to

America's best and brightest in order to close the loop in government efficiency.

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The Lost Battalion of Tet: Breakout of the 2/12th Cavalry at Hue by Charles A. Krohn. Naval Institute Press (http://www.usni.org/navalinstitutepress/index.asp), 291 Wood Road, Annapolis, Maryland 21402-5034, 2008, 210 pages, $21.56 (softcover), ISBN 1591144345.

> Mission: (1) Seal off city on west and north with right flank based on Song Huong. (2) Destroy enemy forces attempting to either reinforce or escape from Hue Citadel.
>
> —Major General John J. Tolson, USA
> Commanding First Cavalry Division (Airmobile)

Those orders, handwritten on a notepad-sized piece of stationery, sent Col Richard Sweet and the 2nd Battalion, 12th Cavalry (2/12) on a doomed mission to reach the South Vietnamese city of Hue during the North Vietnamese Army's (NVA) Tet offensive in the spring of 1968. Revised and released to coincide with the 40th anniversary of the Tet offensive, *The Lost Battalion of Tet* recounts events as they unfold from the perspective of author Charles Krohn as a participant, serving as the battalion S-2 (intelligence officer). It also—and more importantly—addresses those events from his view as an experienced military officer and historian working to capture valuable lessons for future military leaders. In the middle of the 1st Air Cavalry Division's inadequately planned and poorly executed move north from Bon Son and the Que Son Valley to the area around Hue, South Vietnam erupted under the aggressive attack of the NVA's Tet offensive. Without adequate supplies or artillery support (both delayed as a result of the move) and hampered by bad weather and the Tet offensive, the 2/12 encountered and found itself surrounded by numerically superior elements of the 6th NVA regiment guarding NVA headquarters for the forces assaulting Hue.

His forces surrounded and having little-to-no hope of relief or assistance from a paralyzed support system, Colonel Sweet decides to leave behind the battalion's dead and attempt a night breakout, seeking refuge in nearby mountains rather than stay in place and be overwhelmed. Although critics have often second-guessed this decision, only through Colonel Sweet's leadership, as well as the heroism, bravery, and skill of the men of the 2/12, were they able to escape the death trap. For their gallantry, members of the unit received the Presidential Unit Citation and 11 Distinguished Service Crosses.

A solidly researched book, *The Lost Battalion of Tet* includes numerous valuable appendices, maps, and photographs that add significantly to the text. Krohn has written an excellent work on two distinct levels. First, his direct experience clearly comes through in this gripping story. Easily read, even for those with minimal knowledge of Army operations, the book gives the reader a valuable look into the life of a US infantryman in Vietnam, as well as an enlightening view of the Vietnam War from the ground level. A skillful writer, the author pulls his audience into an engrossing and often heart-wrenching story of heroism. Second, Krohn provides a candid and critical analysis of the US Army's failure to support the 2/12. As a Soldier of the lost battalion of Tet, he holds nothing back in his criticism of the failure and lapses of command of the 1st Air Cavalry's support structure. Although some readers may view the author's criticism as personal attacks, it should serve as a valuable lesson to all military leaders that they must be prepared to react when the worst happens and must endeavor to prevent such unconscionable events from occurring. Both a historical work and a study of leadership and command at all levels, *The Lost Battalion of Tet* is a must-read for all military officers.

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America's Army: A Model for Interagency Effectiveness by Brig Gen Zeb B. Bradford Jr., USA, Retired, and Lt Gen Frederic J. Brown, USA, Retired, PhD. Praeger Security International, Greenwood Publishing Group (http://psi.praeger.com), 88 Post Road West, P.O. Box 5007, Westport, Connecticut 06881-5007, 2008, 268 pages, $49.95 (hardcover), ISBN 978-0-313-35024-5.

America's Army presents an argument for utilizing the US Army as a model of effectiveness for improving the interagency process among all levels of government, allies and coalitions, and nongovernmental organizations and industry.

The authors use the Army's current organizational transition and evolution to suggest "lessons learned" to develop policy both vertically and horizontally, candidly admitting a land-power perspective as they develop their thesis. They spend considerable time detailing major tenets of the Army Game Plan for the future and advocate increased attention to and expansion of resources to meet the Army's needs.

Generals Bradford and Brown bring much expertise to their subject, having authored an earlier work, *The U.S. Army in Transition* (1973)—a post-Vietnam review of Army organization and culture. Both have extensive command-and-staff experience through virtually all levels of the military establishment.

The book details the composition of the Total Army (active and reserve components as well as civilian), describing the history and relationship of the Army and the citizenry of the country. Making substantial use of jargon and acronyms that may give the casual reader difficulty, the volume examines in depth the concept of the Long War, as well as ways the Army has adapted, and proposes how it should evolve in the future. The authors present strong arguments for expansion of the Army's leadership-and-development model for building teams of leaders. In addition to the Army Game Plan and its imperatives, they closely examine the Army Force Generation Model and expend considerable effort in describing Army Knowledge Management Efforts, including the Battle Command Knowledge System, which integrates structured professional forums, knowledge nets, and action teams. Generals Bradford and Brown not only cover defense of the homeland throughout their book but also devote an entire chapter to the subject. Furthermore, they emphasize the Army's history and linkage to state and local authorities, most notably with the Army National Guard and Reserve forces, and discuss responses to weapons of mass destruction as well as disaster scenarios.

Emphasizing the success of the Army's evolution to meet the national-security challenges of the Long War and rapid globalization, *America's Army* does not spend much time on failures and less-than-effective accomplishments. When the authors do discuss clear failures, they attribute these misfortunes to a lack of leadership within the Army (e.g., Walter Reed, p. 234, note 1) or a combination of inadequate training and a failure of leadership (e.g., Abu Ghraib, pp. 122–24). In the less-than-effective category (e.g., difficulties with nation building and occupation following the liberation of Iraq), the generals lay the bulk of responsibility on the decisions of civilian leadership (p. 202) and incorrect planning assumptions.

They assert that, ultimately, land power is the decisive component in virtually any national-security challenge, recognizing the need for jointness in most operations but relegating air and sea power to supporting or transitory roles. Declaring that "history is replete with examples of overestimating the effects of bombardment and air strikes on an enemy's will to resist" (p. 34), Generals Bradford and Brown cite the failure of the Israeli Defense Forces to break the power and will of Hezbollah in southern Lebanon as the latest example of this overestimation. Curiously, they make no mention of Operation Allied Force until much later in the book, there asserting that "America's Army has been under-resourced for years by two consecutive administrations mesmerized by the lure of high technology permitting quick, cheap victory—Kosovo, Afghanistan, and Iraq—through top-down net-centric use of firepower—commonly air power" (p. 180). Additionally, in the preface, the authors refer to James Locher's leadership in the bipartisan Project on National Security but don't tie any of their propositions to the project's call for national-security reform.

America's Army is relevant to the Air Force community insofar as it details, in great depth, the perspective of land-power advocates in the national-security arena. It is important that airpower advocates understand such a perspective in the competition for resources and ideas.

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Special Operations and Strategy: From World War II to the War on Terrorism by James D. Kiras. Routledge, Taylor and Francis Group (http://www.routledge.com), 270 Madison Avenue, New York, New York 10016, 2007, 248 pages, $39.95 (softcover), ISBN 978-0-415-45949-5; $160.00 (hardcover), ISBN 978-0-418-70212-6.

At first glance, James Kiras's *Special Operations and Strategy* looks to be another version of *Where Eagles Dare*, celebrating the highly successful and supersecret world of special ops. Very quickly, however, one realizes that this is no salute to the glories of special operations but a critical analysis that examines the varying degrees of effectiveness of such operations throughout the last 60

years. Making use of specific case studies, Dr. Kiras delves into his theories about special operations forces (SOF), their effectiveness at the operational and strategic levels, their misuse, and the potential role they can and should play in extended campaigns of strategic attrition.

Dr. Kiras states that, in the past, military authorities at strategic levels have viewed SOF as having "Great Raid" potential—ending a conflict in one swift blow, single-handedly collapsing the enemy's support system, degrading his morale, and destroying his leadership. In retrospect, though, these special missions have never realized their intended results but have proved unproductive due to poor operational planning and poor understanding of unconventional forces and their structure.

To illustrate his points, Dr. Kiras cites several case studies—most of them from World War II—easily dissecting and pointing out the misuse or misunderstanding of special operations tactics in a strategic sense. Highlighting prime examples of this ineffective strategic outlook, the author mentions the absolute strategic failure of Operation Chastise, which destroyed the Mohne and Eder dams, to degrade Germany's industrial production ability, and the inadequate use and uncoordinated strikes of the British Special Air Service (SAS) before and during the invasion of Normandy.

However, this book does not concern itself entirely with picking apart failed missions and lamenting the incorrect usage of SOF. Rather, it delves into learning about and developing effective, modern special operations strategies for the future, based on past mistakes.

To contrast the poor understanding of special operations strategy and offer examples of its correct application, Dr. Kiras also analyzes specific successes in the SOF community, thus demonstrating that, when understood, special tactics units can prove just as—or more—effective in degrading the enemy than conventional forces. For instance, by using coordinated strikes on specific targets and enabling conventional forces to strike harder and faster than previously thought, the SAS prevented the Deutsches Afrika-Korps from conducting effective warfare during the North Africa campaign.

Special Operations and Strategy delivers its message clearly and in detail. Specifically, it asserts that special operations are more effective in conjunction with conventional forces. Applying strategic attrition, such operations include coordinated targeting of the enemy's resources, communications, and leadership, thereby destroying his ability to conduct war. Pitted against these difficult-to-strike yet vulnerable targets, special operations can deliver disproportionate losses to the enemy, ultimately speeding up the degradation of his capacity to deliver effective offensive and defensive operations on a strategic level.

In the midst of today's ever-evolving and fluid battlefield, special operations have taken on an important role. Demand for the military's—including the US Air Force's—special units and their operators is at an all-time high. We can produce incredible effects when we understand and use our special units correctly. Used poorly or inappropriately, however, these highly trained and elite units will never reach their full potential, thus resulting in prolonged campaigns as well as wasted manpower and resources.

Dr. Kiras provides a valid and thorough overview of special operations strategies. His theories are sound, and their foundations solid. Not a point-by-point examination of "Great Raids," *Special Operations and Strategy* is simply a bare-bones academic analysis. Readers looking for a well-written, in-depth treatment of special operations in both past and future conflicts should add this book to their library.

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Danger Close: Tactical Air Controllers in Afghanistan and Iraq, Texas A&M University Military History Series, no. 113, by Steve Call. Texas A&M University Press Consortium (http://www.tamu.edu/upress), John H. Lindsey Building, Lewis Street, 4354 TAMU, College Station, Texas 77843-4354, 2007, 272 pages, $29.95 (hardcover), ISBN 1585446246.

In *Danger Close*, Dr. Steve Call writes a timely history that traces the development of tactical air control parties (TACP) during the ongoing war on terror. Through firsthand accounts, he skillfully defines military victory by means of what he calls the air-ground dynamic. Avoiding the tiresome concept of transformation, this book offers an upfront view of modern combat fought by warriors who often carry a rifle in one hand and a handset in the other. Call follows the development of the TACP in the war on terror as a means of understanding the greater institutional and technological changes recently made in deploying close air support (CAS) and provides insight into the evolution of that mission. Through this exciting story of

TACPs and the rapid technological and organizational changes they represent, the author reminds us of certain timeless principles necessary for victory and fills a void by analyzing modern combat from a tactical viewpoint.

Dr. Call, whose background includes service in both the Air Force (as a B-52 pilot and a squadron commander) and the Army (as a liaison officer), is uniquely qualified to trace the background of the intra- and interservice debates that emerged after Operation Desert Storm, as well as the subsequent application of technology to CAS. Innovations used by the TACPs—such as strike coordination and reconnaissance aircraft and new computer programs such as Falcon-View—provide opportunities for unprecedented accuracy in firepower. The author cites the kill-box interdiction system, which replaced the fire support coordination line, as an example of the organizational changes that TACPs worked with to implement this technology. He effectively outlines such developments while masterfully tracing the roles of TACPs.

The ingenuity and flexibility of TACPs, whether serving with special forces on horseback in Afghanistan or using bomb-crater analysis to establish back azimuths to enemy firing locations, demonstrate their role as the vital nexus of the emerging air-ground dynamic. TACPs possess high degrees of intelligence, initiative, and flexibility, as well as open access to commanders and the ability to communicate the usefulness of CAS to them. In part, the corps-shaping strategy developed for Iraq reflected the imagination and openness of leaders aided by capable TACPs that clearly showed the benefits of CAS. *Danger Close* repeatedly affirms the competency of TACPs under extremely trying conditions, balancing such modern-battlefield dilemmas as rules of engagement, safety of friendly forces, utilization of terrain, and, in many cases, anticipation of command decisions, all the while under global media scrutiny.

Dr. Call offers applicable battlefield lessons for future warriors, describing an interesting dilemma known as "Predator crack"—an overreliance on remotely piloted aerial vehicles—and pointing out the myopic view of the battlefield it can present to the undiscerning commander. He also settles the historic debate over which branch of the service can win a war alone. His conclusion? None of them! Referring to the recipe for victory repeatedly used in Afghanistan and Iraq, the author terms it an exploitation of the enemy's "air-ground dilemma" (p. 237). That is, the proper maneuvering of ground forces compels the enemy to react and move to repel the assault. Existing technology can see this movement and then kill the enemy. If the enemy does not move or mass, ground forces can outmaneuver and destroy him piecemeal. The TACP serves as the focal point for the coordination of this effort, backed by other observers flying above. Dr. Call forcefully concludes by citing his concern about the danger of TACP successes being copied by various services eager to get in on the action. He contends that if we sacrifice individual experience to institutional expediency, an inability to deconflict aircraft—not to mention other dangerously counterproductive conditions—could arise.

Danger Close does not mire itself in theory but offers students real tactical lessons about the use of supporting arms in modern warfare. Aside from the paucity of maps and absence of a bibliography, it effectively fills a gap in literature on the war on terror by examining modern warriors as well as the larger and increasingly joint service culture they represent.

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Space Warfare and Defense: A Historical Encyclopedia and Research Guide by Bert Chapman. ABC-CLIO (http://www.abc-clio.com), P.O. Box 1911, Santa Barbara, California 93116-1911, 2008, 403 pages, $95.00 (hardcover), ISBN 978-1-59884-006-3.

Space Warfare and Defense covers a range of topics, from Project Corona to the Brilliant Pebbles Program to a listing of the most recent published literature on the military use of space. Asst. Prof. Bert Chapman, a government information librarian at Purdue University, deserves commendation for authoring this impressive work, which fills a gap in space-warfare scholarship. This significant and comprehensive treatise provides layman and expert alike a voluminous amount of data, both historical and contemporary, on space weapons and their development.

The book's 10 chapters are divided into two parts, the first beginning with a chronology of momentous dates in the history of space warfare. This leads to in-depth coverage of US military space policy through key space programs and weapons development from the Eisenhower to the Bush administrations. Also included is a little-

known and surprising plan proposed by the US Army for establishing a moon base by 1966. Additionally, this part enlightens readers on US military space programs and the development of space weapons, from the Manned Orbiting Laboratory of the 1960s to the present YAL 1A Laser Project. Each particular data entry commences with the historical background of each system or program and concludes with remarks on its current status.

The author then delves into the space weapons programs of Russia, China, and the European nations, tracing the programs' roots from the post–World War II period through the Cold War to the present day. The final chapter of part 1 tackles some of the international and US laws on space such as the Anti-Ballistic Missile Treaty, the Communications Satellite Act, and the Moon Treaty, among others.

The second part constitutes another gem, offering an overview of various US Department of Defense agencies, think tanks, and foreign research institutions concerned with space warfare. It covers their activities, latest publications, and online addresses.

Well written and researched, *Space Warfare and Defense* is supported by a number of photographs and supplemented by a 17-page glossary. Each chapter provides a list of further reading and online references on the subject. The book will serve as a valuable primary resource for researchers, space enthusiasts, policy makers, employees of space agencies, officers either currently on staff with space commands or NASA or awaiting assignment, and individuals seeking information about the relationship of space to national security.

Cdr Mark R. Condeno, Philippine Coast Guard
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Reflections of a Technocrat: Managing Defense, Air, and Space Programs during the Cold War by Dr. John L. McLucas with Kenneth J. Alnwick and Lawrence R. Benson. Air University Press (http://aupress.maxwell.af.mil), 155 N. Twining Street, Maxwell AFB, Alabama 36112-6026, 2006, 390 pages, $33.00 (softcover), ISBN 1-58566-156-2. Available free from http://www.au.af.mil/au/aul/aupress/Books/McLucas/McLucas.pdf.

A standard dictionary definition of *technocrat*—"a technical expert, especially one in a managerial or administrative position"—does not do justice to the accomplishments of Dr. John McLucas, the 10th secretary of the Air Force, as outlined in his book, *Reflections of a Technocrat*. To call this an autobiography is also to undersell the broader historical context it provides. Neither is it a simple historical record of dry lessons learned. Dr. McLucas writes in an engaging style that shies away from sermonizing. The narrative is so seamless and absorbing that it seems that the reader is having a conversation with an important uncle whose life's work was never fully explained to him or her. Upon listening to Dr. McLucas's personal history, one can't help describing it as the life experiences of Forrest Gump (the author is a self-admitted product of the "Deep South") (p. 4) augmented by the innovative dossier of Kelly Johnson's Skunk Works. McLucas's unassuming nature would probably downplay both references affably. However, his sense of service to the nation comes through as his most enduring and admirable quality: "I believe that when citizens are offered the chance to serve in positions that can deal effectively with major issues facing the country, they should make themselves available" (p. 59). The main theme of *Reflections of a Technocrat* is the way McLucas repeatedly made himself available throughout his life. His first transition was from the life of an academic to that of a naval officer during World War II. After the war, he established himself as an entrepreneur and engineer in the civilian world, experiencing the life of a military contractor firsthand. Dr. McLucas followed this up with a string of successful, diverse roles in and around government, against the background of the Cold War, serving in the Defense Department, NATO, and MITRE Corporation, as well as serving as undersecretary of the Air Force (leading the then-classified National Reconnaissance Office), secretary of the Air Force, and, finally, administrator of the Federal Aviation Administration. By examining this impressive lifetime of service, we can develop a true definition of the title *technocrat*.

The breadth and depth of Dr. McLucas's experiences guarantee that anyone familiar with the evolution of airpower will recognize innumerable challenges and successes, both contemporary and historical. Reading about the Tactical Fighter Experimental calls to mind the Joint Strike Fighter. Interservice rivalries he faced over the OV-10 aircraft mimic those involving the Joint Cargo Aircraft of today. His time in France with NATO provided challenges similar to the ones

facing coalition and allied leaders in the twenty-first century. Acquisition difficulties, force modernization under constrained and shrinking budgets, transformation initiatives, secrecy versus bureaucracy, and parallels between the Cold War and the global war on terror—they're all in this book.

Frustratingly, the reader has to divert to other sources to learn the rest of the story. Because the story line follows Dr. McLucas's life, it is mostly left up to the reader to research the details of how programs and circumstances played out after his departure; the book relates only a few gratifying vignettes on the evolution of the National Reconnaissance Office and space systems into the late twentieth century. Sadly, the book does not have a happy ending. The final chapter is not Dr. McLucas's; he passed away on 1 December 2002. In this last installment, the reader is privy to a final look at the life of this technocrat: a series of corporate, intergovernmental, and nongovernmental air and space efforts inspired by his "techno" background and informed by his "cratic" experiences.

Reflections of a Technocrat appeals not only to a wide cross section of the Air Force but also to the greater defense community. For the military historian, Dr. McLucas provides informed insight into technology's coming-of-age period in the armed forces, particularly the Air Force. Air and space power advocates will recognize and appreciate the systems and organizations one or two generations removed from today's service culture. Finally, current and future military leaders will find the obstacles (e.g., a nation at war abroad, intertwined with challenging domestic issues) and advice in this book as applicable today as they were four decades ago.

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A Reckless Grace: An Account of Pilots and Their Planes from the Jennys to the Jets
by Margaret Taliaferro. Lulu Press (http://www.lulu.com), Lulu Enterprises, 3101 Hillsborough Street, Raleigh, North Carolina 27607-5436, 2008, 112 pages, $24.48 (hardcover), ISBN 978-1-4357-0955-3.

In *A Reckless Grace*, Margaret Taliaferro not only describes aviation from its early years through the 1960s but also offers a biography of former aviator Champe Taliaferro, whose career ranged from the time just prior to World War I to his retirement from American Airlines in 1964. Everyone, especially aviation enthusiasts, will enjoy this exciting and exquisitely researched book.

The author recounts many stories involving aviators whose lives ended early due to their carelessness or negligence, including accounts of Champe's mishaps as a young pilot. For example, he and a fellow aviator made an inverted crash into a lake in an attempt to perform stunts over a train, trying to impress a young lady (pp. 6, 53–56). Reckless abandonment and intoxication contributed to the incident. Though severely injured, Champe recovered to fly again.

The book explores the attitudes and culture that make and define traditional pilots, many of whom had the attitude that "money was cheap. Who cared about it anyway? Why hoard it when it's a well-known fact that you can't take it with you, and your departure date might be very imminent? Like tomorrow." Poker games, dice, heavy drinking, and other pleasures reflected these pilots' disdain for traditional values (p. 68).

As the focus of the narrative, Champe exemplifies both good and bad pilots (who often end up dead). The author addresses principles ignored by many of Champe's friends who died while he survived: "Never try to stretch a glide when your speed is slow and you're losing altitude. . . . Never take unnecessary risks. . . . Never underestimate a flight. . . . Never fly when the odds are too high against you. . . . The flight is never over until the plane draws up to the passenger ramp" (p. 91).

Though an interesting read, *A Reckless Grace* often becomes somewhat dry when it delves into changes in the aviation industry. For readers not attuned to aviation, the author's discussion of the intricacies of aerobatic flight maneuvers and the technical aspects of cross-country flights—including instrument-landing systems, nondirectional beacons, and ground-controlled approach radar—may seem too detailed.

In the first half of the book, which not only relates Champe's experiences as a stunt flyer but also offers many examples of pilots meeting untimely deaths, the author captures the excitement and flair of flight, effectively piquing the interest of both established and aspiring military fighter pilots. Indeed, Taliaferro's experiences appeal to all pilots as they follow his career from flying airmail routes to flying passengers for commercial airlines, all the while filling the role of meteorologist, helmsman, and commander

(pp. 45–52, 57–63, and 65–75). Appropriately, the author emphasizes the importance of these roles to flight safety.

In these pages, the reader also learns about the danger of pride, arrogance, and envy—traits that define many of the pilots who met their doom at the controls of an aircraft; they also explain why some pilots live the way they do. Clearly, these life lessons have an application far beyond aviation.

An excellent read, *A Reckless Grace* should hold the interest of all pilots, civil and military. Here, readers will find exciting stories of barnstormers and airmail carriers as well as examples of the dangers of taking a cavalier approach to flight. Although this book may serve as a testament to the unique nature of pilots, it also offers a reality check that will allow young pilots to become old pilots. I highly recommend *A Reckless Grace*, especially to aspiring and current pilots.

Cadet Marvin Weatherspoon
Texas Southern University

Contrails over the Mojave: The Golden Age of Jet Flight Testing at Edwards Air Force Base by George J. Marrett. Naval Institute Press (http://www.usni.org/navalinstitutepress/index.asp), 291 Wood Road, Annapolis, Maryland 21402, 2008, 264 pages, $29.95 (hardcover), ISBN 978-1-59114-511-0.

Judging from the gushing praise on the dust jacket and many online reviews of George Marrett's *Contrails over the Mojave*, I was expecting quite a read. Unfortunately, this slim volume did not live up to my perhaps overheated expectations. I was immediately struck by the fact that Marrett's career narrative began in the 1960s. Describing the early 1960s as the "Golden Age of Jet Flight Testing" seemed, at best, an overstatement and, at worst, a disservice to the truly astonishing advances made a decade before. Even the author briefly acknowledges this fact. As he put it, "By any standard, the 1950s was a remarkable period in the history of aviation . . . where, if a concept seemed feasible—or even just desirable—it was evaluated" (p. 7). Perhaps *Jet Flight Testing at the End of the Golden Era* might have been a more appropriate subtitle for this volume.

This is at least the third and possibly final book in what is arguably a larger history of George Marrett the pilot. As a series, his previous books, *Cheating Death: Combat Air Rescues in Vietnam and Laos* (Smithsonian Books, 2003) and *Testing Death: Hughes Aircraft Test Pilots and Cold War Weaponry* (Praeger Security International, 2006), chronicle a long and distinguished career of both military- and civilian-engineering test flying. Unfortunately, this book, as the apparent chronological bridge between the other two works, is a difficult read, leaving this reader disappointed.

As Marrett freely admits in the preface, his book incorporates a number of previously published stories, one having appeared in *Flight Journal* (June 2000) under the title "Chasing the XB-70 Valkyrie" and another, "Sky High," concerning his experiences with the NF-104, in the Smithsonian's *Air and Space Magazine* (November 2002). Similarly, "Defending the Golden Gate" (F-101B), "Space Cadets," "Don't Kill Yourself," and "Sore Feet" all found their way into this book (sans the pictures that add so much to magazine articles). Unfortunately, the rest of the book appears to be built of similar stuff, crafted lovingly, albeit often incompletely, with material recompiled from various aviation periodicals.

As a longtime reader and avid collector of air and space as well as military books and other publications, I have enjoyed many shorter tales of hairy missions, good and bad pilots, and their aircraft. However, in my view a *book* should be held to a higher standard. *Contrails over the Mojave* seems rather more an anthology of short biographies of "folks I flew with" than a complete chronology of the author's experiences during the period. The disjointed grouping of these biographical essays takes away from, rather than adds to, the story of Marrett's maturing as a test pilot during the early stages of his aviation career. Unfortunately, trying to reconcile the two approaches—chronological narrative versus individual biographies—proved sufficiently distracting that the underlying story was almost lost.

One of the supporting players in the drama of aircraft testing in the 1960s rather than one of the leads, Marrett never flew the cutting-edge (he might have said "bleeding-edge") experimental aircraft—the X-15s, XB-70s, or YF-12s/SR-71s—that so inflamed the imagination of that era's and subsequent eras' pilots. He does little to "blow his own horn" on the work he did in support of flight testing at Edwards AFB, California, and one gets the mistaken impression of a lightweight in the flight-test community, relegated to flying aircraft that were not the most glamorous—or merely chasing the ones that were.

This was, no doubt, an unintentional minimization. The required flying was (and is) no less arduous or dangerous, as the anecdote concerning the XB-70 "photo opportunity" collision (pp. 143–45) so aptly illustrates. Assessing the design deficiencies of some aircraft that would eventually become part of the nation's front line of defense in the Cold War, as well as serving—sometimes with distinction, sometimes not—in the Vietnam conflict, was critically important work rather than a mundane task, as it came across to this reader. Perhaps in retrospect this was the underlying message: that (to mangle Milton) "they also serve who fly the F-4, F-5, and F-111." Unfortunately, this message was so well camouflaged that when I learned that there was substantially more to the story of Marrett's flying life than alluded to in this book (in the epilogue and, no doubt, chronicled more expansively in "Testing Death"), I was truly surprised.

On balance, *Contrails over the Mojave* certainly has bright spots—items that were uniquely George Marrett and that contributed to my understanding of the larger events at Edwards and the world at that time. The saga of the live missiles on board his cross-country Voodoo (pp. 37–40) was humorous in the description of a young lieutenant's dilemma, and the glimpse of how nuclear war might have come to California, provided by the Cuban missile crisis (pp. 48–52), was altogether chilling. Sadly, other snippets were of interest but of insufficient detail to do more than whet the appetite. One particularly unfinished story caught my attention: Marrett's emergency landing of a NORDO (NO RaDiO) T-38 on the "wrong" lake bed (p. 126). (In an era before cellular telephones, they were down without communications, unremarked in the middle of nowhere; how exactly *did* they get home?)

Overall, I found *Contrails over the Mojave* an uneven book, though assuredly one having substantial wheat among the chaff. Judging from the acclaim of such aviation notables as Walter Boyne and Richard Hallion, Marrett's long career has been of considerable interest to the community. Perhaps considered in the context of a three-volume body of work, it might measure up to those accolades and this reader's expectations. Whether my curiosity to prove that thesis will lead me to read Marrett's other books remains to be seen.

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Leave No Man Behind: The Saga of Combat Search and Rescue by George Galdorisi and Tom Phillips. Zenith Press (http://www.zenithpress.com), 729 Prospect Avenue, Osceola, Wisconsin 54020, 2008, 656 pages, $30.00 (hardcover), ISBN 978-0-7603-2392-2.

George Galdorisi and Tom Phillips's book *Leave No Man Behind* is an in-depth treatise on combat search and rescue (CSAR), the efforts that our military forces make to recover personnel isolated behind enemy lines. Both authors served long careers as US Navy helicopter pilots and are well versed in this subject. Using their personal knowledge and extensive research skills, they have crafted an excellent collection of rescue vignettes that they weave into a longer tale of successes and failures in this very important mission area. I know both of these gentlemen and have watched this project evolve.

Starting with the birth of aviation, they show how the mission and the equipment to carry it out have developed through our nation's conflicts. Their treatment of early efforts in World War I is illuminating, as is the coverage of rescue in World War II, which includes ample data on US Navy efforts in the Pacific—an area little reported to this point.

The real heart of the story focuses on rescue operations from the Korean conflict to the present. Galdorisi and Phillips take us through early rescue attempts in Korea and the subsequent development of units dedicated to the mission. After recounting the armistice, they offer a "reckoning"—an assessment of the total rescue efforts in the war, analyzing what it all meant. After showing how rescue forces were allowed to wane after the war, the authors essentially follow the same script for the long war in Southeast Asia. This series of chapters, 260 pages long, provides an intense and detailed look at that conflict, followed by another "reckoning" to tally up accomplishments and costs.

After using this construct again for Operation Desert Storm, though, the story thins out, for straightforward reasons. First, the fact that we have not had another conflict that matches the number of aircraft losses suffered in Southeast Asia or even Desert Storm has led to a decreased need for CSAR missions. Second, in later conflicts, special operations forces performed many of our rescue missions. For obvious reasons, little can be said openly and in any real detail about them. Those stories remain to be released.

The authors have made a huge contribution to the CSAR body of knowledge. To this point, most historical writing on this subject has focused on the efforts of US Air Force rescue units simply because that service has always had an excellent institutional collection policy that has generated a body of knowledge ripe for historical analysis and writing. From the Air Force perspective, historians have subsequently produced great studies of rescue in Korea, Southeast Asia, and Desert Storm. No other service has produced any such comprehensive writing. In this work, the authors optimized those Air Force collections. Going well beyond that, though, they visited old Navy unit archives and veterans in an effort to eloquently lay out the efforts of US Navy rescue units and personnel. I salute the authors for this exciting and original work!

I am a little disappointed, however, that the book contains so few pictures. Good shots of the aircraft, people, and places mentioned in the narrative would add to the presentation. I suggest, too, that work like this requires good maps to help the reader understand the geography of each of the combat theaters involved.

Overall, though, I think that the authors have created a fine document on CSAR and a very interesting historical work. I highly recommend it to anyone with a particular interest in the mission area or even military history in general. To Galdorisi and Phillips I say, "Bravo Zulu," and hope that they have a follow-on opportunity to expand this work with another volume on the subject.

Col Darrel Whitcomb, USAFR, Retired
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Base Politics: Democratic Change and the U.S. Military Overseas by Alexander Cooley. Cornell University Press (http://www.cornellpress.cornell.edu), 750 Cascadilla Street, Ithaca, New York 14851-6525, 2008, 328 pages, $29.95 (hardcover), ISBN 978-0-8014-4605-4.

Following the Second World War, the United States developed a series of robust overseas bases that serve as the so-called tip of the spear to carry out US policy. The United States maintains these bases for a variety of reasons—which have changed over time—but undeniably they play an integral role in how the US government implements policy vis-à-vis the rest of the world.

Author Alexander Cooley offers an intricate theoretical set to help explain the relationship between host nations and the United States with regard to military basing. He explains how at different times for different states, US bases can serve as "political hot potatoes" whereas at other times, surprisingly, they are simply nonissues. Additionally, he offers some keen analysis of two-level politics—the idea that the face a leader presents to the United States on basing issues can be very different from the one presented to the domestic body politic.

One of Cooley's key arguments concerns the domestic political situation within the state itself, irrelative to factors one might initially think important, such as the host country's size (whether in terms of geographical area or population) or stability. The author maintains that such matters as the credibility of the ruling regime and the need for economic stimulus from the US military presence, whether predicated on the spending of service members or actual injections of cash and goods from the US government, are equally important.

Aside from the overall theoretical outlay of Cooley's research, he offers valuable, in-depth comparative analysis of case studies of hosts such as the Philippines, Japan, Korea, and the Azores. These studies breathe life into his theoretical approach, lending validity to the author's powerful hypotheses. Additionally, the breadth of the research lends rigor to Cooley's claims by demonstrating their applicability across both time and geography. That this book should have a serious scholarly impact on research into international relations and assessment of the effect of these bases will come as no surprise.

Boasting considerable utility in explaining relationships between the United States and the countries that host its overseas bases, this book deserves immediate assimilation into professional military education. Its explanatory power—and its new perspective on how and why these relationships do or do not work—cannot be overstated. Well-written and thoroughly researched, *Base Politics* is a winner.

David J. Schepp, Seventh Air Force Historian
Osan Air Base, Republic of Korea

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